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NEW SERIES.
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AGRICULTURAL STUDENTS' GAZETTE.

EDITED BY

STUDENTS AT THE ROYAL AGRICULTURAL COLLEGE,
CIRENCESTER.

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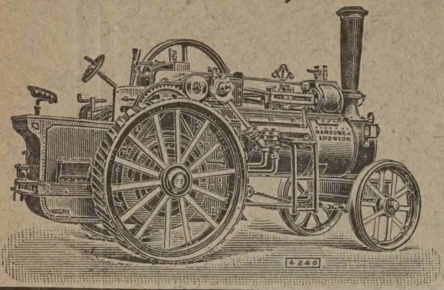

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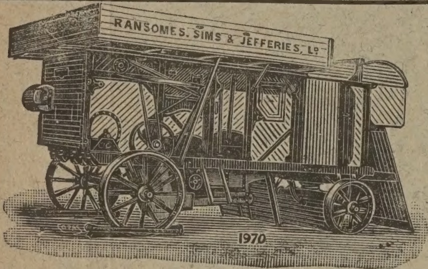

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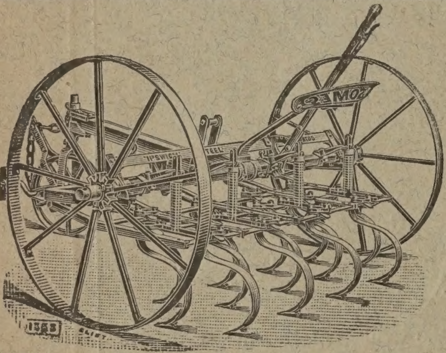

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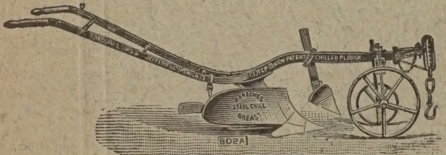

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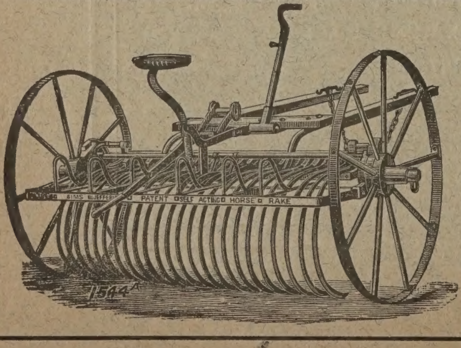
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R.A.C. Forestry Excursion at Büdingen, with Fürst Wolfgang von Jsenberg—Büdingen.

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FORESTRY EXCURSION.

The vacation tour in Germany with the object of studying the forests of that country was a decided success. The party set forth on the closing day of the session and travelled direct to the university town of Giessen, which has the oldest and one of the most famous university schools of forestry. In the succeeding days the most varied methods of forest management under different conditions of soil and elevation were closely examined. At Giessen the party was cordially welcomed by Professor Dr. Hess, Director of the Forest Institute, who very kindly gave us every facility for inspecting the Institute and Forest Garden. Unfortunately Dr. Hess was unable to accompany us to the forest garden owing to an important engagement, but under the charge of Herr Forst-assessor Brill a most instructive day was spent. The Forest Garden, established about 1840, is situated some distance from the University. The walk out proved exceedingly interesting as the road passed through dense spruce and Scots pine about 70 years old of excellent growth. Under the latter a young growth of oak, sown by jays, was noticed, but owing to want of light the young trees were not making any growth. The effect of soil on vegetation was noticed; conifers were found on the sandy soil on either side of the road, but near the Forest Garden, where basalt begins, beech and ash had taken their place.

At the Garden we inspected the specimen trees and then proceeded to view the experimental plots, which were interesting and instructive. Having regard to the controversy as to the advisability of ploughing land before planting, it was interesting to note in a plot of Norway maple, one portion with the grass removed and the other with the grass left, that the trees in the latter shewed much better development. In another plot the trees had been planted in their order as shade bearers, and some surprise was expressed at hornbeam being placed after the black pines and limes.

Pruning experiments have been carried on for some years (since 1870) and proved instructive, the trees pruned, conifers and broad-leaved, shewing a much better form factor. We were also informed later that a better price per cubic foot was obtained for the timber. The cost of pruning was estimated at 1d. a tree. In a spruce plot containing pruned and unpruned trees growing side by side the difference was very marked. Another interesting plot, originally planted with Scots and black pines, three of the former to one of the latter, was now practically pure Scots, the black pines having been suppressed, proving that the Scots in this particular locality is ultimately faster producing and could stand some shade, as the black pines are of faster initial growth. A perfect example of strip sowing was noticed—a spruce plot having seeded itself under an adjoining plot of oak which had first been opened out in order to assist the young spruce. Owing to the seeded area being so regular at the edge it was hard to believe that the work was not artificial.

Among the other plots, all of interest, we noticed beech and spruce planted originally equal aged and alternately. The spruce had almost entirely suppressed the beech in 16 years.

Beech with *quercus rubra* (red oak).—This tree is being, as we saw later on, planted extensively throughout Hessen. It is very fast growing, and in this plot, although 10 years younger than the beech, had exceeded it in height growth. A very healthy plot of sitka spruce showing a height growth of quite 2ft. a year was noticed.

Hickory.—Planted pure, but as it did not thrive in the light soil of the Garden, the hickory had been removed, leaving 16 trees on one-eighth of an acre, and the plot planted up eleven years ago with *Pinus rigida*, and these are now about 20ft. high and above the hickory.

In the Lodge we found many objects of interest—insects, fungi, seeds, timber, etc.

Returning to Giessen, we spent the remainder of the day in the Forest Museum, and examined with much interest the excellent collection, which is most complete. In the evening a very pleasant time was spent with Dr. Hees and Herr Forst-assessor Brill at the Restaurant Metropole.

On Saturday, Frankfort Town Forest was visited. We were informed that the area, about 8,300 acres, was acquired by the town from the Emperor Charles IV. in 1372. It is at present divided into two districts. On the south-east of the town is the Oberwald or high land, highest point 475 feet, comprising about 4,350 acres. West of this is the Unterwald containing about 3,950 acres and practically level. The climate is mild, the summer being dry and hot. Late frosts (May and June) are very frequent, and this has to be taken into account in the regeneration of the wood, and in addition storms do considerable damage. The soil varies considerably from a dry, loose sand to a sandy loam, but in general it is exceedingly dry. This is gradually getting worse owing to the sinking of the ground water level due to pumping for the town supply. The species grown on the Unterwald are oak, beech and pines, the distribution being 1,672 acres oak, 309 acres beech, and 1,860 acres pine. Originally oak and beech predominated, but now conifers, especially Scots pine, occupy the greater portion, and the area under pine is constantly increasing, the badly growing and retrogressive oak woods, due to the drying up of the soil, giving place to pines. The rotation is 120 years for all species. For re-stocking, Natural regeneration is carried out where possible. Beech, under the compartment system ; conifers, suitable standards being retained in groups, but planting has in general to be adopted ; and oak partly natural and partly by means of strip sowing. Owing to drought, strong growth of grass, and late frosts, the shelter wood has to be retained for a considerable period, and, in addition, a good deal of soil preparation is necessary. Fencing of the young growth is absolutely necessary, both against game (deer) and the public. Weymouth pine grows well here and is being planted extensively; two-year plants are set out in rows 3ft. apart (formed by turning back a turf and planting in the trench), and 6in. apart in the rows, with a planting stick or dibble, at a cost of 2s. per 1,000. The wages paid are very high, 4s. a day for men and 2s. 6d. for women. Owing to the strong growth of grass weeding is necessary for three years.

The Nursery proved interesting, the young plants looking healthy. Most of the plants are bought in as seedlings (the Weymouth pine cost 2s. to 3s. per 1,000) and schooled for one year. It would take too long to mention all we saw during the day, but we were particularly struck by the effect of the lowering of the water level on the growth of oak, the large trees in many cases were drying up and becoming stag-headed. We were also interested in some very fine woods of Scots pine underplanted with beech, a young Weymouth pine plantation about 40 years, the trees averaging 6 inches ¼-girth at breast high; also an oak and Scots pine wood underplanted with Weymouth. They suffer a good deal from insect and fungi, particularly *Xyleborus dispar*, bark beetles. *Peredermium strobi* is also common and destructive. On our way back to the station we came through a wretched wood of Scots pine. We were informed it belonged to a Commune and had received very little care, and that each year for some time past it had been attacked by pine sawfly (*Lophyrus pini*). It was, however, too dark for the party to pay much attention to it. All the timber is sold standing. The gross income is £16,000 a year, with £1 per annum per acre net profit. This is exceedingly good, taking into account the many difficulties they have to contend with. The woods are open to the public and expensive roads have to be maintained at a cost of £1,200 a year. We were much indebted to Forst-assessor Ulrich, who had placed himself at our disposal for the day, and who very kindly gave us full particulars as to the management, and went to no end of trouble to make our visit the success it was. Sunday was spent in Frankfort and no work was decided on. A portion of the party, however, spent an interesting day in the Oberwald and inspected some fine woods of pure Weymouth and Scots pine and beech in different stages of growth.

On Monday, after an early breakfast, we took train to Mittledick. Here we were met by Forstmeister Hillerich and his assistant, who accompanied the party. The extent of the district under his charge is about 3,800 acres. It forms part of the Geraner woods, and lies in the triangle between Darmstadt, Frankfort, and Mainz, an exceedingly favourable situation for the disposal of the timber, owing to the close proximity to Frankfort and a densely populated district. The area is almost level except for a small drop from east to west in the direction of the bed of the Main. Elevation from 325ft. to 400ft.

above sea level. The soil is alluvial, varying from fine sand to coarse gravel, subsoil an impervious clay at varying depths, the characteristic feature being poverty in lime. In spite of the poorness of the soil it is, owing to its favourable physical qualities, especially its lightness and warmth, a good one and produces sound timber with a uniform growth. Owing to its dryness a canopy is very necessary for its protection. Where the subsoil reaches to a higher level the soil is fresh, even damp in places. Rainfall 18 to 20 inches. Late frosts are very prevalent, occurring as late as the 24th May, and in a beech wood we noticed the frost line about 12ft. high. During the last few years, however, very little damage has been done. The crop is composed of oak 40 %, Scots pine 30 %, and beech 20 %, with spruce, alder, birch, Weymouth, and larch 10 %—for the most part of third quality. Early in the day we were shown the largest oak on the area, known as Bismarck's oak. It was 60ft. high to the first branch and 72ft. to the base of the crown, 220 years old, and contained 240 cubic feet of timber said to be worth £50. The yearly yield is 348,000 cubic feet. It was formerly 325,000 to 400,000 cubic feet; of this 35 to 40 % is large timber and 60 to 65 % firewood, average yield of pine and oak being 7,000 cubic feet per acre. The gross return per acre is £2 1s., and the average price of timber 4d. per cubic foot. This is considerably higher than the average for Hessen, which is approximately 19s. 6d. and 2½d. respectively. This favourable return is no doubt due to the factors before mentioned and also to the two railways and main road which traverse the district. The object of management is the production of large timber. The rotation period for oak (all sessile) is 160 years (formerly 200), Scots pine and beech 120 years (formerly 100). The trees are however mostly older. A large proportion of the returns come from the early thinnings sold as pitwood, the oak and pine then being underplanted with beech and hornbeam. The standards left are pruned to a height of 35ft. with the aid of high ladders at a cost per stem of 2d. to 3d. oak, 1d. to 2d. Scots.* Regeneration is chiefly artificial, but with oak there is also very good natural regeneration in groups. Hitherto the planting of Scots pine has been especially difficult, chiefly on account of the cockchafers, *Melolontha vulgaris* and *M. hippocastani*, and needle-shedding disease (*Hysterium pinastri*), which occurs nearly every year. It was very bad in 1906 although the plants were sprayed with copper sulphate for two years previously.

We were much interested in a transplanting machine we saw in the Nursery, but the conclusion arrived at was that, although it set out the young plants with mathematical accuracy, it did not appear to save any time. Cockchafer damage in the Nursery was very bad, but we were informed they were now not so numerous this year, and the same is reported from all over Prussia, and it is hoped they will continue to decrease.

* The timber realises the following prices: beech 8½d. per cubic foot, oak 5s., Scots pine 1s. What surprised us most was the price received for hornbeam, viz., 1s. 5d., as much again as beech; it is used for tool handles and mallets.

In order to catch the beetles birch are planted all round the Nursery and kept at about 10ft. high. The beetles when they emerge alight on the birch and are shaken down and destroyed by children. Lupins for green manure occupied a quarter of the Nursery ready to be ploughed in.

The beech in many districts shewed very poor growth, and were being replaced by pines. We inspected several areas of young pine looking very well. The old beech are cleared, leaving strips for protection, and after the roots are extracted the land is ploughed with deep-digging ploughs, the young pine being afterwards dibbled in at the rate of 20,000 to the acre. The same procedure is followed in planting pine after pine. They are greatly troubled with pine weevil, but not to the extent they would be if the roots were not extracted, and it is fortunate they have a market for the root-wood which slightly more than covers the cost of extraction. Bark traps are laid in all plantations and regularly attended to. The pines also suffer at intervals by the caterpillars of the pine moth and the pine looper, and the oaks by *Tortrix viridana*, all of which do considerable damage.

In the afternoon we inspected mature woods, 200 to 220 years old, of Sessile oak and beech of excellent growth ; the oak especially were much admired, being long, clean, and cylindrical, each containing from 150 to 160 cubic feet, shewing the excellent development of oak when grown with beech. A plantation of black walnut proved interesting. The nuts are first germinated in a pit, and then sown *in situ.* The growth was excellent, and in this way the long tap root is not interfered with. Alder coppice 45 years old was shewn us, the wood being converted into cigar boxes. As the light was now going we were reluctantly compelled to finish our visit, after an exceedingly interesting and instructive day. We were accompanied to the station by our friends, and after we had endeavoured to thank them for their kindness to us, and receiving a hearty invitation from the forstmeister to pay another visit to Mittledick, we returned to Frankfort very tired after our long walk.

Leaving Frankfort by an early train on Tuesday morning, we arrived at Darmstadt, and after a hasty lunch met Oberförster Urstadt, and proceeded by car to inspect the town forest. On leaving the cars we first inspected some young plantations of Douglas and Nordman's silver fir. Surprise was expressed that the Colorado variety of Douglas had been planted, and we were informed that in addition to being frost hardy its ultimate growth was very satisfactory, Professor Meyer contending that this variety ultimately becomes a larger tree, despite its slow early growth. We next went through a large beech wood, very patchy in places and uneven in growth, due to the mother trees in the last regeneration period being left too long. The spaces when these were felled had been planted with larch, which had grown well. The soil in this wood varies considerably in depth, and the management has wisely decided to gradually cut over the area, and plant the shallow portion with spruce. The portion already carried out showed excellent growth of spruce. For æsthetical reasons the work has to be carried out in quite small patches. In the portion to be retained under beech the crop was estimated to contain from 8,500—10,000 cubic feet per acre. Thinnings are made every ten years, yielding 1,000 to 1,100 cubic feet per acre, with a final crop of 7,000 cubic feet per acre. Soil third quality. From the spruce 10,000 cubic feet per acre is expected as a final crop. Some surprise was expressed at the number of nesting boxes provided for small birds. These are very necessary, as in dense tracts of woods, particularly of conifers, birds are very scarce, and the importance of encouraging them is apparent. A blue tit when shot recently had in its crop 25 sawfly pupæ.

On land of no use for agriculture, and purchased from the Commoners for 28s. per acre, we saw a plantation of *Quercus rubra.* The original intention was to work the area as coppice, but owing to the decline in price for bark and coppice produce it had never been cut, and was now ready to be thinned for the first time, and will be treated as high forest. The growth was exceptional, and although the timber is not so valuable, it will be mature and produce larger butts and a larger return in a shorter period than any other oak, and should be a profitable tree to be grown here. Sycamore and maple are also largely grown, mixed with ash, and we noticed some oak and ash underplanted with lime, and were informed lime was now largely used for this purpose where beech would not thrive.

Late in the afternoon we had tea at a popular resort at the highest point in the wood, and ascending a tower to obtain a view of the surrounding country were fortunate enough to catch a glimpse of Zeppelin's airship in the distance. Next day we heard it had been burnt.

Continuing our walk, we came to a silver fir wood, 45 years old, which had been established by sowing, and had done remarkably well, being nearly twice as high as an adjoining and much older beech wood, and in another case the silver fir was 20ft. higher than beech at the same age, viz., 60 years. Our attention was next directed to natural regeneration of ash, and also ash and sycamore. In the case of pure ash, the grass is removed from under the young trees owing to danger from frost. In the case of ash and sycamore mixed they do not mind the grass, as the sycamore reflects the heat radiated from the ground, and so protects the ash. Lime was here used for under-planting ash in place of hornbeam previously employed, as it protects the soil better and forms richer humus.

An early start was made next day with the oberförster, and the remainder of the Town Forest and Grand Ducal Park and Woods were visited, including, amongst other things, splendid mixed woods of beech and oak. The beech on the sides of the rides had been sun-cracked, and were protected by tying heather round the stems. Natural regeneration of beech in groups. Oak originally grown with an agricultural crop (usually potatoes), but we were informed this practice had now been abandoned, having been found too expensive. A fine crop of even aged oak and beech, 160 years old. In establishing new areas of oak, they sow the acorns in strips, or ladder sowing, except *Rubra*, which is planted; we inspected several young thickets raised in this manner, all showing vigorous growth. A mixture of oak and ash was interesting, shewing the ash has no cleaning effect on the oak. This compartment was being regenerated in groups, but some soil preparation is necessary. The soil, we were informed, is only second and third quality for beech. The former yields 10,000 to 11,000 cubic feet per acre, and the latter 7,000 cubic feet per acre, as a final crop. Thinnings are made every ten and five years respectively, and yield in the latter case 1,000 to 1,500 cubic feet. The rotation is from 160 to 200 years. The former period would be quite sufficient for all purposes, but the beech are left longer in order to produce mast for the swine, which are preserved. The beech is used for turning, wooden shovels, and, when creosoted, for sleepers. On our return we came to a spruce wood, which had grown very fast, but was now dying although only 55 years old. We were informed that they were all pumped owing to root rot, probably due to the roots penetrating the stiffish subsoil here close to the surface and dying through lack of aeration. *Trametes radiciperda* was plentiful in the wood, and Herr Urstadt has since very kindly sent a specimen of the fructification to the museum. The wood is being cleared off and the land will be planted with beech. A few of the party took the opportunity to visit the Hessen Exhibition, and were much impressed with the furniture shewn, made from lime and sycamore, the general effect being much admired.

Herr Urstadt had very kindly arranged a programme for the remainder of our time in Germany, and this necessitated our leaving Darmstadt for Büdingen by an early train. On arriving at Büdingen, a charming old town with the walls still standing, we were met by Kammerdirektor Müller, and after depositing our luggage, proceeded under his direction to inspect that portion of the property in the immediate vicinity. We were first attracted by a large wood of oak and beech, planted originally with beech 2 to 3 years, and oaks 5 to 6 years. The soil was a rich red loam. The oaks had mostly disappeared, and the remainder will be shortly removed, the beech having outgrown them. A start of three years on this soil is not sufficient for oak. A pure beech wood, 100 years old, aspect south, soil moist red loam, with a splendid crop, was next examined. A thinning had just been completed, 1,400 cubic feet per acre having been taken out. The method of the thinning had been as follows. In the 60th year 1,000 cubic feet was cut, 80th year 570 cubic feet, 100th year 900 cubic feet. The final felling, 20 years hence, is expected to produce 7,000—8,500 cubic feet quarter girth measure. A portion of this compartment higher up the hill, and with a very stony soil, had been clear felled and the land planted with Scots pine and spruce, strips of beech being left for shelter until the young trees get established.

On the following morning we started at 6 o'clock in carriages kindly placed at the disposal of the party by the owner of the property, Prince

Von Isenburg and Büdingen. The first stop was made to inspect some conifer and other plantations. In many places we noticed gaps caused by *Agaricus melleus.* A young regeneration of oak, beech, and hornbeam just being cleaned. A silver fir plantation 28 years old and doing very well, a division of beech and hornbeam about 29 years old, the shelter trees had been finally removed 18 years ago. During the regeneration period the young trees had been badly damaged by mice, but they were now in vigorous growth. One thinning had been made, 430 cubic feet per acre being removed. A Scots pine wood, 70 years old, in which a partial clearance had been made, removing 3,500 cubic feet, leaving 2,600 cubic feet. This wood was underplanted with silver fir, one metre apart, with a circular spade, at a cost of 14s. per acre. The young plants had been obtained from the adjoining compartment. In the next division a silver fir wood was being regenerated under protective standards; there was a very fine young stock on the ground, including some Weymouth pine from seed blown in from an adjoining area. About 30 of the mother trees to the acre were still standing, and these would be removed shortly. One very large tree had been killed by *Agaricus melleus.* A Douglas and spruce plantation 18 years old on a sandy loam proved interesting—originally planted one metre apart, one row of Douglas, and then a row of Douglas and spruce alternately. Ten years ago the Douglas caught up to the spruce and killed them, and the wood is now practically pure, but the Douglas are very branched. The present contents was estimated at 3,430 cubic feet per acre. Every Douglas is retained as long as possible, even those with double leaders, in order to keep the canopy close. Some interesting measurements have been made in this section in order to observe the growth of Douglas and to obtain form factors. A very accurate record is kept of all wood taken out, and this will prove of value later on for yield tables. The details up to the present, together with two sample stems, were kindly presented to our museum by the Kammerdirektor.

We joined the conveyances at this point and drove through a very fine young wood of beech, and shortly afterwards left the carriages to inspect a mature beech wood in the initial stages of regeneration. The seed felling had been made, and as the position was exposed ploughing in square patches, check board fashion, had been resorted to to prevent the leaves being blown away. On the other side of the road was a beech wood completely regenerated and with the standards removed, the blanks being planted with *Quercus rubra.* This was interesting, since we were able to see the number of seedlings considered by the management to be sufficient—apparently they do not like the beech too thick. They like room for planting in conifers and other trees, principally larch and oak. This is an ideal way to grow larch and oak, particularly if they are planted in small groups. A young beech plantation, 25 years old and just being thinned, raised the point as to whether the produce could be profitably disposed of at home. The poles cost 2s. 6d. to 5s. per 100 to cut out, and are sold for about 20s. per 100. We here joined the carriages, and after a short drive through dense woods of beech got out to inspect two pine and spruce woods 32 and 17 years old, the latter planted 3ft. apart and not yet thinned was growing clean and fast. On the basalt the spruce proves nearly as fast in growth as Douglas, but on dry sandy soil it is left very far behind. Leaving the carriages we walked through some 86 years old beech ready for thinning. There were about 900 trees to the acre, containing about 7,000ft. On the right of the path the beech was 10 years older, and had been thinned and was putting on growth very fast, the height growth in each case being excellent. On coming through this wood and along some open land kept for deer grazing we arrived at a shooting hut picturesquely situate by the side of a lake. Here we met and were introduced to our host, who had kindly provided luncheon for us, to which we did ample justice. The toast of our health, proposed by the Kammerdirektor, was drunk with three "hochs." Dr Gundry responded on our behalf, and we endeavoured to repeat the "hochs." We were evidently not at home with this accompaniment to a German toast, and did not feel that we had done ourselves justice until we had given three cheers, led by Major Margesson. Our friends responded with three hunting cheers. After a photograph of the group had been taken we said goodbye to his Highness and proceeded to inspect the remainder of the estate. We returned to our hotel at 4.30. and after partaking of some coffee accepted the Prince's invitation to look over the Schloss, a very ancient and interesting building. We left Büdingen with many regrets, as the old town had charmed the whole party, and we had received so much kindness from everyone during our visit. Our special thanks are due to the Kammerdirektor for all he did for us, and many of us hope to return at no distant date.

Aschaffenberg was our next stop, and we intended to spend the next two days in the Spessart. In the morning we were disappointed, as a real wet day, the only serious downpour so far, set in and made it quite impossible to start. Through the kindness of Professor Dr. Fürst, Director of the Forest Institute, we were permitted to view the excellent Forestry Museum, and after spending a most instructive morning we obtained permission to visit a cellulose factory, and were much interested in watching the process of paper making from the raw material to the finished article. The factory is a large one, and uses 2,500,000 cubic feet quarter measure of spruce per annum. For a cellulose mill to be worked at a profit it is calculated that about 12,000 cubic feet of wood are needed weekly, or 600,000 cubic feet per annum, an equivalent to a yield from about 150 to 200 acres of 40-year-old spruce, or an area of 6—8,000 acres of well-managed spruce woods to procure a continuous supply. The wood is cut into thin chips and then ground down between grooved rollers and afterwards boiled under high pressure in a solution either (1) of soda or (2) of calcium sulphite. The raw cellulose thus obtained is washed, then bleached with chloride of lime, and finally pressed between heated rollers and dried. On the following morning an early start was made for Röhrbrunn in the Spessart. We had been told all along that we should certainly see nothing like the oaks to be found here. They came up to our expectations. One estimated as 1,000 years old contained 1,200 cubic feet, 5 feet quarter girth, and 116ft. high, and most of them are 300 years old with beech 120 years old. The soil is a deep sandy loam and the yield 8,500 cubic feet per acre. For the oak they receive 5s.—6s. a cubic foot, 13s. having once been obtained. This high price is due to the beautiful uniform colour of the timber, so much so that you cannot recognise the heartwood. The beech is naturally regenerated, good seed years occurring every 8—9 years, but they are not continuing to grow pure beech, a large proportion of the area being given up to conifers, the beech representing from 30 to 40 % of the crop to preserve the soil.

Unfortunately we had to leave fairly early in order to enable some of the party to catch their train for Denmark to join the excursion of the Royal English Arboricultural Society. The remainder spent the Sunday in Heidelberg. The town woods were very interesting, but we had no time to do them thoroughly as we had to leave on Monday morning for Forbach, in the Black Forest, where we spent a most interesting time. Forstmeister Stephani was exceedingly kind, and each day placed his carriage at our disposal and did everything to make our visit as complete as possible. The space at my disposal will not permit of my dealing in detail with all we saw, which must for the present be dealt with shortly. For the most part the woods are composed of silver fir and spruce. The enormous size of the trees came as a surprise to many of the party who had never seen such development. The woods are at present chiefly worked on the selection system, trees of all ages being represented on the ground; but we were informed that a gradual change to the compartment system is, where possible, being brought about. A very large sum has been spent during recent years on road making through the forest. Part of the forest belongs to the town of Forbach, and the income derived from the town portion is sufficient to cover all municipal expenditure, and there is no local rate levied. Each inhabitant in addition receives firewood to the value of £3 per annum. We were interested to find that the bark of spruce and silver fir still paid to strip for tanning. Opportunity was taken to visit a large wood pulp factory. In this case the wood fibres are separated mechanically by grinding—spruce wood is preferred and then silver fir. Both furnish a pale yellow pulp with fairly long fibre. Scots pine is difficult to grind, containing too much resin. Among the broad-leaved trees lime, aspen, and poplar give good results and a white pulp, but all give a short fibre. Cellulose is mixed with the wood pulp, colouring matter being added at the same time. After this the process is much the same as at Ascheffenburg. In this particular part of the Black Forest the industry has made enormous strides. I counted seven factories in quite a short distance, and a large new one is about to be erected higher up the valley.

In concluding these notes I should like once more to refer to the cordial welcome we received at the hands of the Forest officials who placed themselves for whole days at the disposal of the party. Their kindness was much appreciated and will not soon be forgotten. The failures as well as the successes were shown without reserve. We are also indebted to Professor Schlich for his valuable advice in making our arrangements for the tour, and for his letters of introduction to the officials. Our thanks are also due to Professor Gundry for his invaluable services to the party. It is hoped that this vacation tour will be the first of many others, and that next year a visit will be made to the French and Belgian forests. H. A. PRITCHARD, F.S.I.

ROYAL AGRICULTURAL COLLEGE RECONSTRUCTION SCHEME.

A Scheme of Arrangement was sanctioned by an Order of the Chancery Division of the High Court of Justice made by Mr. Justice Swinfen Eady on 29th July last, under which a new Company (not trading for profit) has been registered to take over the assets and liabilities of the College.

The Hereditary Director and Governor of the newly constituted College is Earl Bathurst, and the first Ordinary Directors and Governors are:—Viscount Cobham, Lord Moreton, Sir John E. Dorington, Bart., Colonel T. W. Chester-Master, and Colonel J. F. Curtis Hayward, with Representative Governors appointed as follows:

By the Gloucestershire County Council, three:—
  Francis Adams Hyett, Esq., Painswick House, Painswick.
  Charles Bathurst, Esq., Lydney.
  Robert Gray, Esq., The Cottage, Sherborne, Northleach.

By the Herefordshire County Council, one:—
  Henry James Bailey, Esq., Rowden Abbey, Bromyard.

By the Monmouthshire County Council, one:—
  William Edward Carne Curre, Esq., Itton Court, Chepstow.

By the Somersetshire County Council, one:—
  Arthur James Somervile, Esq., Dinder House, Wells.

By the Wiltshire County Council, one:—
  Jacob Selman, Esq., Kington Langley, Chippenham.

By the Worcestershire County Council, one:—
  Appointment not yet made.

By the Hebdomadal Council of the University of Oxford, one:—
  William Somerville, Esq., M.A., 121, Banbury Road, Oxford.

By the University of Bristol and West of England (in course of foundation), two:—

By the Royal Agricultural Society, one:—
  Henry Dent Brocklehurst, Esq., Sudeley Castle, Winchcombe, Glos.

By the Bath and West of England Agricultural Society, one:—
  Appointment not yet made.

The new Board of Governors have held three meetings at the College, on the 26th August, 29th September, and 3rd October. Ordinary Meetings of the Governors will in future be held at the College quarterly on the first Tuesdays in February, May, August, and November.

Lord Moreton is the Chairman of the Governors, and Mr. E. B. Haygarth the Secretary.

THE SPIRIT OF PLACE.

The last twenty years has assuredly seen a re-awakening of interest in the history and local peculiarities of Gloucestershire generally, and of the Cotswold country in particular. I use the word "re-awakening" advisedly, for the eighteenth century abounded in careful and voluminous writers upon, and historians of, the county of Gloucestershire. In 1712 were published that massive and most informing tome "The Ancient and Present State of Gloucestershire," by Sir Robert Atkyns; in 1720 Cox's "History of Gloucestershire," and towards the end of the century, Rudder's even larger and fuller history, also Bigland's.

Atkyns and Rudder are both well worth study, for they abound in that subtle and pervading atmosphere "the spirit of place." The very names belonging to the various coats of arms, pictures of which cover many pages in the forefront of Sir Robert Atkyns' book, are redolent of English country life, and suggest the most vivid pictures of the solid comfortable gentlemen who bore them. Some of them indeed seem quite inevitable in their euphonious swing as—"Castleman of Coberly," "Catchmaid of St. Briavels," "Driver of Avening," "Hussey of Saperton," or "Parmiter of Olston." Sir Robert's comments on his own county, too, are full of quaint wisdom not untouched occasionally with a gentle irony, as in the chapter called "The Inhabitants," where he points out that the clergy were no longer to be envied—"upon account of their excessive greatness and revenues they are not dependent upon any foreign power or jurisdiction, but own the same royal supremacy and are under the same obligations to their country, and being a married clergy give the same dear pledges of security to it," whereupon Sir Robert concludes his arguments with the remark, "there is no reason therefore that the people should hate them."

These old histories, however, are not accessible to everybody; still, lucky dwellers in the dear Cotswold country have at their call a whole library of easily procurable books which deal with this singularly beautiful and characteristic part of the county. Amongst these are two, which, to my thinking, stand out head and shoulders above the others, because in them is embodied that spirit of place which alone can give life and individuality to descriptions of scenery and of country life generally. The books to which I refer are "By Thames and Cotswold" by William Holden Hutton, and "A Cotswold Village" by the late J. Arthur Gibbs.

Almost any intelligent and painstaking person who is possessed of a certain modicum of literary facility can compile a book of quite reliable information about any part of the country selected without having himself in the smallest degree absorbed the atmosphere of the district he sets out to describe. The result inevitably takes the form of the guide-book, and such books, useful and meritorious though they be, bear a family resemblance almost as strong as that of one railway time-table to another. A quite excellent and interesting example of this style of work is "The Cotswolds," described by F. Duckworth, which appeared quite recently and is redeemed from the commonplace by a set of entirely delightful coloured illustrations by Mr. G. F. Nicholls.

Mr. Duckworth's book is quite interesting and instructive, but it is written from the *outside*, and he tells us in his preface that his "aim has been, through details historical and picturesque, to view the district as a whole, insisting for the most part on the typical rather than the particular." And the result is that he seems to write from the point of view of one who spent a summer holiday, perhaps, in the country he sets out to depict; giving a few hours here, a few days there, to the main places of interest which have already been pointed out in other people's books.

Now what is so delightful, so personal, so pervading, about the work of Mr. Hutton and Mr. Gibbs is the comfortable sense of leisure that their books convey. Their readers must feel that through long years of affectionate intercourse and observation they have absorbed the atmosphere of the old-world places they love so well, until it has become a part of themselves; and that if they give at all they must give forth abundantly of that indescribable life-enduing Spirit of Place. This mysterious power can only come from long, loving, and intimate association. The attitude of mind in which such books are written is as far removed from that which compiles a guide book, as a Turner landscape is removed from a kodak snapshot of the same place.

Take this little passage from "Cotswold and Vale" in a chapter describing Burford.—"Its quaint costumes still recall the days before Victoria reigned. True it has gas in the streets, but it is turned out in winter before nine o'clock, and belated travellers must pick their way home with lanthorns or in the dark. As you walk its streets you think irresistibly of Cranford, and you see perhaps some pretty figures in bonnets and shawls that might have sat at tea with Miss Matty. You wonder if "Pickwick" is not still coming out here in the monthly numbers, and you are not surprised to find in the library the old books that you can never see anywhere else. . . . . Still there are the quaint old bonnets and the croquet, and now and then a shepherd's crook passing through the streets, to assure you that not all England moves at the same pace, and that there still lingers much of the old beauty of peaceful living on the slope of the Cotswold Hills."

Many who have never seen Burford love it well, simply because Mr. Hutton has taken them to live there. His own love for what was once "a very greate market towne replenished with much people" finds expression at the end of his book in some very graceful verses. I take leave to quote one stanza—

"O fair is Moreton on the Marsh
And Stow on the wide wold,
But fairer far is Burford town
With its stone roofs grey and old."

The Cotswold village immortalised by Mr. Gibbs is within an easy bicycle ride of the R.A.C. And surely there is nothing more interesting and almost exciting than to verify the impressions given in a vivid and characteristic piece of literary work. Moreover, it is not only the village itself that is to be seen. An important feature of that kind and pleasant book is the portrait of "Tom Peregrine," the gamekeeper. Now Tom Peregrine is still to the fore, and fortunate persons possessed of introductions may yet find him in the low-roofed house beside the bridge; a little older perhaps, a little troubled by asthma, but just as keen-eyed and cheerful and talkative as when Mr. Gibbs wrote of him, "a more amusing companion or keener fisherman never stepped." I can conceive of no better luck for any young fisherman than to go out with Tom Peregrine. He is a perfect mine of every sort of sporting lore, and with the ready generosity of the true sportsman he is ever ready to impart to the neophite all manner of useful "tips" from his abundantly filled storehouse. Moreover, the fisherman who takes out Tom Peregrine will, whatever his own fortune, in no case return with an empty basket. As Mr. Gibbs truly said of him, "he can charm trout from water in which no one else can get a rise."

Whenever one reads a particularly lovable book in which the personality of the writer is strongly manifest, one feels how lovable the writer himself must have been; only to be (occasionally) disillusioned by people who have known that writer. Readers of the "Cotswold Village" need have no such fear. Tom Peregrine the chronicled has himself turned chronicler and will talk for hours of the master who so well deserved the devotion he undoubtedly inspired. The memory of Mr. Arthur Gibbs, that gracious memory, is kept very green and well-tended in the little house beside the bridge, and the impression given in the "Cotswold Village" of a personality, above all scholarly and simple and sympathetic, is deepened to a certainty when the people he lived among describe his kindly and considerate ways. It is heartening and refreshing in a somewhat cynical age to find that a really beautiful character has an enduring influence apart from the written word.

Such a book as the "Cotswold Village" could only be written slowly. "Mr. Arthur was eight years writing it," says Tom Peregrine, and I can well believe it. Not hastily acquired is that mysterious power—does it still come from the four winds I wonder?—that can breathe life into dry bones, that can, by a magic manipulation of certain words, create for us people and environment and even climate: the subtle, searching, indefinable Spirit of Place. O. S.

AGRICULTURAL ORGANISATION.

Of all the remedies prescribed for agricultural depression, none has been more persistently advocated than that of organisation, and it would appear that at last the agricultural mind is beginning to appreciate the soundness of the advice. That the organisation of the business of farming is making headway, no one who has studied the matter closely during the last decade can have failed to realise. Landlords, land agents, and farmers would do well to further by all means in their power the organisation of the agricultural industry, and as it is amongst those classes that this *Gazette* largely circulates, the opportunity is now taken of saying a few words about the present position of the movement with the object of enlisting the sympathy of those readers who may not hitherto have given the subject the consideration it deserves.

We have on many occasions been informed of what has been done in Denmark and in Ireland in regard to this matter, and it is frequently asked why we have not more readily followed their good examples. It is of course possible that the conditions existing in this country would not be favourable for the adoption in detail of the Danish methods, but that is not a sufficient answer.

The agricultural industry can be improved in the following ways :

1. *The cost of production must be reduced.* This means that increased crop yields per acre must be secured by keeping abreast of scientific work. It is the old principle of two blades of grass being made to grow where one grew before. Feeding stuffs, fertilisers, seeds, and implements must be purchased on the best possible terms and used with intelligence, and labour-saving machinery must be adopted where possible.
2. *The returns for produce sold must be increased.* This means that either higher prices must be paid by the purchasers, or economies must be secured in the marketing.
3. *The general conditions under which farming is carried on must be improved*, and burdens which unduly oppress the agricultural industry must be lightened or removed.

Now these ends are undoubtedly to be attained in one way only, if they are to be attained at all, and that is by organisation. The dictionaries define the word "organise" thus—"so to arrange the parts that the whole may act as one body." That is exactly what needs doing in the agricultural industry.

Dealing with the subject under the three heads already given, let us consider first the reduction of the cost of production. With regard to increased yields, the main help must come from the agricultural educational institutions of the country, the experimental farms, and the research laboratories. This subject does not directly come within the scope of our inquiry in this article, but it may be said in passing that the spreading of information obtainable from these sources has been very much facilitated by the visits of inspection of large parties of farmers made under the auspices of the various farmers' associations and agricultural societies in the country.

The co-operative purchase of feeding stuff, fertilisers, seeds, and implements is the matter which has perhaps engaged most largely the attention of those who take the lead in agricultural organisation. Co-operative societies for these purposes have been formed in a number of districts, and though in most cases they are carried on with successful results, it must be admitted that in many instances the support given by the farmers is nothing like so good as it should be.

The general principle on which these societies are worked is exceedingly simple. The capital is raised by the farmers who desire to deal with the society; they become shareholders, a £1 share being the usual minimum holding. On this share the farmer receives 4 per cent. interest. The capital thus raised is usually insufficient to start the business, but the banks are generally willing to advance money on favourable terms to co-operative societies. The orders of the members are bulked and quotations are obtained direct from the manufacturers for these bulked orders. The goods are then sold to the members by the Society at a slight advance, sufficient to cover working expenses. If at the end of the year any balance is left over it is divided as a bonus amongst the members proportionately to the amount of business each has transacted through the Society.

All this appears very simple on paper, but in practice there are many difficulties which arise, the main source of all being a want of loyalty to the society on the part of the farmers. It will be at once recognised that as soon as a co-operative society starts its operations in any locality, it is likely to be immediately met by a strong opposition and competition by the dealers and agents who form the usual channels through which the farmer obtains his requirements. Their existence is seriously endangered by the co-operative society, which seeks to transfer the dealers' and agents' profits into the pockets of the farmers. Then when the co-operative society applies to the manufacturer for his lowest agents' terms, he replies that he has various established agents to consider, and that to supply to the society on lowest agents' terms means the ruination of the agents. The shrewd manufacturer will not endanger the existence of the agent till the co-operative societies can come to him and say—"We now represent the bulk of the farmers in the country. We will supply their whole requirements, and you may save yourself the expense of retaining the services of your many travellers and agents."

Immediately the societies can do that the middleman's profit will become the farmer's. This seems so obvious that it is surprising the farmers have not more readily come forward and become loyal members of a co-operative society. If they did so, it must be to their advantage and more especially so to the small farmers, who would obtain their small consignments on equally favourable terms to the large buyers. Too much importance cannot be attached to this question of loyalty, as it is one of the essentials to success in all co-operative undertakings.

It is found in practice that farmers are apt to use the society as a lever to reduce the prices quoted by outsiders. They obtain the society's quotations and then approach the outside dealer and say that unless he can offer more favourable terms the order must go to the society. The dealer, under these circumstances, is prepared to reduce his margin of profit almost to the vanishing point, his object being, at whatever cost, to injure the reputation of the society. A farmer giving his custom to the outside dealer under these circumstances is obtaining a temporary benefit with the certainty that he is seriously prejudicing his future interests, for no sooner are the society's operations brought to a close by this want of loyal support than the dealers see their opportunity and up go the prices again. Unless farmers will give these undertakings their whole-hearted support they cannot hope to reap the full benefit of co-operation. Transactions with a co-operative society do not admit of long credit, and this is where the outside dealers and agents have their strongest weapon against the societies. Long credit is often more important to a farmer than low cost, and it is certain that the dealers take full advantage of this circumstance. Can this difficulty be overcome? It arose in an acute form in Ireland, and the case was met by the establishment of agricultural credit banks, which have been so largely instrumental in saving the agricultural situation in that country. To what extent the system is applicable to this country is a question which cannot be fully discussed in this article, but it seems not unreasonable to conclude that it is worth very serious consideration. The more business a co-operative society can do, and the larger the membership, so much the more successful must it be in securing lower prices. There must be more societies distributed over the country, and these societies must federate and combine their orders. They could then approach manufacturers with the certainty of obtaining the lowest quotation for their requirements.

Let us now pass to the second heading, that of securing better prices for our produce. The same principle must apply here as in the case of purchasing farm produce, which we have just been considering, namely, that we must endeavour to secure the middleman's profits for the farmers in addition to his own profits as a producer. This question of co-operative selling has not received so much attention as that of co-operative buying, for the reason that it presents more difficulties, but there is reason to hope that these may be eventually overcome. Some of the existing co-operative buying societies also undertake selling for farmers, and when this can be done it tends very much to increase the business, as the system in a measure overcomes the difficulty of credit already referred to, and enables the society to compete on better terms with the outside dealer, who usually does this cross-trading with the farmers.

The sale of milk and its products through the medium of farmers' co-operative societies has probably been attended with more success than has been the case in regard to other agricultural produce. Cheese factories in this country have attained a certain measure of success when well managed, especially so when the sale of winter milk has been also engaged in. In the large milk producing counties in the Midlands a successful system has been in operation by the Farmers' Associations, whereby milk is sold in the large towns direct to the retailers through the medium of agents established there by the associations. These associations are not co-operative in the true sense of the term, and no shares are taken up by members, who only pay an annual subscription to ensure membership, and then pay a trifling commission on the sale of their milk. By this system the services of the large wholesale milk firms are dispensed with and their profits go into the pockets of the farmers. This system is capable of considerable extension, and there appears to be no valid reason why in time the whole profits on milk, from the cow to the consumer, should not come into the pockets of the farmer. The services of the agents of the associations in the town are available for the sale of other farm produce besides milk, but up to the present little has been done beyond milk sales. There are about a score of such associations which practically cover the main milk producing areas of England, and there can be no doubt that their influence, especially in regard to the dairy farmers' interests, has been of a highly favourable character. Combination has undoubtedly secured better prices for milk.

Coming now to the improvement of the general conditions under which farming is carried on, the advantage of united action seems to be so obvious as to hardly need advocacy. Legislation bearing on agriculture has to be carefully watched and its course guided by the free expression of the views of agriculturists, and this is only possible by combination. Railway companies have to be dealt with, and while the individual is disregarded, a combination of farmers can have some influence in matters affecting their common interests.

The innate conservatism and individualism of the British farmer are obstacles in the way of any rapid advance of co-operation and organisation, and it seems most desirable that the principles and benefits of co-operation should be explained in the schools to those whose future career is to be farming, so that they may grow up with right ideas.

An equal necessity exists for this subject being exhaustively dealt with in all Agricultural Colleges, so that the student on leaving can exert the right influence on those with whom he comes in contact.

In these short notes it has been the writer's desire not to ignore the difficulties which arise in the endeavours now being made to organise the agricultural industry in England, but rather to point them out clearly so that every effort may be made to overcome them.

Co-operation is the one hope of agriculture, and the sooner it is recognised the better for all concerned. The Irish farmers were reduced to desperate straits—ruin stared them in the face, and in a happy moment co-operation was held out to them as a means of salvation, and they seized the opportunity with the splendid results we are now all so familiar with. Let us hope that the British farmers will not let matters go so far as the Irish did, but be wise in time and at once apply themselves to the study and practice of co-operation.

Stafford, November 23, 1908. EDWIN SMITHELLS.

THE KING'S BIRTHDAY AT THE ROYAL AGRICULTURAL COLLEGE.

The Royal Agricultural College on Monday, November 9th, celebrated the birthday of its Patron, his Majesty the King, by a pleasing and interesting ceremony which was rendered possible by the kindness of the Countess Bathurst. The flag hitherto flown from the College Tower on prize days, match days, and other festivals required renewal, the Principal determined to replace it by another, and to take advantage also of the opportunity of hoisting a flag of wider Imperial significance in harmony with the widespread influence of the College itself. At this juncture, with characteristic thoroughness Lady Bathurst expressed her desire to present a Union Jack to the College, and also consented to attend for the purpose of formally unfurling it on the King's birthday. A considerable company of representative visitors gathered in the quadrangle in response to the invitation sent out in the name of the Governors, Staff, and Students. The Countess Bathurst was accompanied by Earl Bathurst, Lord and Lady Moreton, and the Principal, Professor Ainsworth Davis.

Lord Moreton said that being a Royal College, that morning they had sent a telegram of congratulation to their King and Patron on his birthday, and he was glad to be able to read the following reply they had received from his Majesty: "The Principal, Royal Agricultural College, Cirencester—I am directed by the King to thank the Governors, Staff, and Students for their loyal congratulations, and also for informing him of the intention of the College to unfurl a new flag. —Knollys." (Cheers.) As they knew, they were there that day to witness the unfurling of the new flag which Lady Bathurst had been good enough to present to the College, and by giving them that flag her ladyship had added another item to the very long debt of gratitude which the College owed to Lord Bathurst and his family. Lady Bathurst had not only given them that flag, but she had been kind enough to come from London to unfurl it, and without detaining them longer in that cold spot he would ask Lady Bathurst kindly to proceed to unfurl the flag she had given to the College.

Lady Bathurst was thereupon handed by Major Margesson the halliard communicating with the neatly rolled flag, and having given it a sharp tug the large and handsome Union Jack was instantly "broke" at the head of the flag-staff on the College Tower, floating out bravely in the shrewd easterly breeze. The flag was saluted with hearty cheers, the band playing "God save the King."

The Principal, in proposing a vote of thanks to Lady Bathurst, said their gratitude to her ladyship was great for being present on that occasion. It was not only for presenting the flag, but also for coming to the College that day to "break" it, which he believed was the technical term, that they desired to thank Lady Bathurst. The flag now flying from the flag-staff, and which he believed was the right one, was about as good as any they could progress under. All these years they had been sailing under false colours, for they had been flying the naval ensign, and he hoped that the new flag, Lady Bathurst's "breaking" it, and the unusually fine weather might all be taken as good omens for the future. He had great pleasure in proposing a hearty vote of thanks to her ladyship.

Major Margesson, as representing the students, seconded the proposition, and said in thanking Lady Bathurst they wished also to express their gratitude to the Governors, those who had been so good to them by starting that College and keeping it going, especially Lord Bathurst, Lord Ducie, and Lord Moreton. (Applause.) They were very sorry Lord Ducie could not be with them, but they thanked him sincerely for all he had done for them. They now saw the Union Jack flying over them. Up to that day they had flown the flag in which the white ensign, the blue ensign, and the red ensign were combined, with St. George's Cross for England, St. Andrew's for Scotland, and St. Patrick's for Ireland, and the whole flag representing our dominions throughout the world. (Cheers.) They hoped that well as the College had done in the past it would do better in the future. They were now on the eve of great changes. They had a new constitution, and the College had before it an enlarged sphere of usefulness. They had a new Principal who, if he would allow him to say, had already won the esteem and regard of the Students, and he thought the College might say of itself as Tennyson said of "The Brook":

> Men may come and men may go,
> But I go on for ever.

(Cheers.)

At the call of Major Margesson three hearty cheers were given for Lady Bathurst, who briefly expressed her thanks, followed by cheers for Lord Moreton, under whose leadership a similar compliment was paid to Earl Bathurst. The party then adjourned to the College Hall for tea.

OBJECTS FOR THE MICROSCOPE AND HOW TO MOUNT THEM.

(Continued.)

STAINING IN ONE COLOUR.

Method by Borax Carmine.—This colour is suitable for ovaries, fruits, etc. To make it, take 1 dram of pure carmine and 2 drams of strong liquid ammonia. Dissolve the carmine in the ammonia and add 12 ounces of a saturated solution of borax in distilled water. Filter and bottle till required for use. Objects to be stained are immersed in a few drops of the above in a flat-bottomed watch glass for three to five minutes, after which they are well washed in methylated spirit. They are then soaked in a mixture of one part of hydrochloric acid and five parts of methylated spirit till the colour changes to a bright scarlet. Now wash in ordinary methylated spirit. Remove to strong spirit for ten minutes; dehydrate; clear in clove oil; soak for a few minutes in turpentine; drain, and mount in Canada balsam. (*See later.*)

Method by Hæmatoxylin.—Take 30 grains of hæmatoxylin, 3½ ounces of absolute alcohol, 3½ ounces of distilled water, 3 ounces of glycerine, 30 grains ammonia alum, 3 drams glacial acetic acid. (A) Dissolve the hæmatoxylin in the alcohol; (B) Dissolve the alum in the distilled water. Add the glycerine and the acetic acid. Mix A and B together and leave for a month before using.

To stain objects, mix 30 drops of the above solution with one ounce of distilled water and leave them to soak in it for 15—30 minutes. Wash well in distilled water, and afterwards in ordinary water to fix and deepen the colour. Dehydrate in strong methylated spirit for 10 minutes, clear in clove oil, drain, and mount in Canada balsam.

DOUBLE STAINING.

Mr. Cole's Method.—Dissolve 1 dram of pure carmine in two drams of liquid ammonia and add 12 ounces of a saturated solution of borax in distilled water. Filter and keep in a stoppered bottle. Bleach the sections; wash well, and then stain them in the above for 5—10 minutes. Now wash in methylated spirit and afterwards soak in a mixture of one part hydrochloric acid and thirty parts of methylated spirit till excess of colour is removed. Wash in methylated spirit to remove all traces of acid, and then stain for thirty minutes in a solution made of 5 grains of acid aniline green dissolved in 6 ounces of methylated spirit. Again wash in methylated spirit, clear in clove oil, and mount in Canada balsam.

The above method is a good one for staining sections of stems, roots, leaves, etc.

MOUNTING IN CANADA BALSAM.

Take one ounce of dry Canada balsam and dissolve it in one ounce of benzene. Filter and store in a glass bottle with a loose top like the cover of a spirit lamp. As the benzene evaporates add a little from time to time.

To mount an object take a clean slide, and slightly warm it. Place the object on centre of slide, drop some Canada balsam on it, and carefully lower a cover glass on top, taking care that the object is kept in the centre. Press down the cover glass and put away the slip to dry. Air bubbles, unless entangled, work out by themselves. Next day it may be necessary to add a little more balsam should there be any spaces under the cover glass.

The above method does well for large vegetable sections, etc., but for such objects as spicules of *gorgonia*, leaf hairs, *polycistina*, etc., there is a better plan. Take a slide and breathe on it heavily. Now drop on one or two clean cover glasses, which will adhere to the damp surface. On these latter place some balsam, and with a lifter place the objects on top; stir in with a needle, add a little more balsam, and put away in a dust-proof spot for twelve hours. Now push the cover glass to the edge of the slip, and take them up with a pair of forceps. Add a drop or two of fresh balsam, and reverse the cover glasses quickly on to the centre of a warm clean slide. Press out the excess of balsam and any air bubbles, and put away to dry. Finally clean and cement up.

ENTOMOLOGICAL SPECIMENS.

Wings and scales of lepidoptera are usually mounted dry. Other insects and their parts require different treatment. After killing store them in methylated spirit till required.

If the specimen is to be mounted whole it must be removed from the spirit to water and left to soak for 3 or 4 hours. It is then placed in a 10 % solution of caustic potash in distilled water, and left till it becomes soft. Pressure on the thorax will decide the time for removing the specimen It may take but a few hours, or run into weeks. When ready wash repeatedly in water to remove every trace of the potash. Drain all water away, and place in strong acetic acid for twelve hours or until required. On removing from the acid wash repeatedly in water and leave in water for half-an-hour. Now place the specimen in a shallow saucer full of water, and with a needle or fine brush spread out the limbs. Next float it on to a clean slide, drain away the water, and re-arrange the wings, legs, and antennæ. Place a slip of paper (doubled if necessary) at each end of the slide on same side as the insect and press another clean slide on top of all till the insect is flattened out. Tie the slips together with thread, taking care not to move the surfaces in contact, and drop the bound slides into methylated spirit till required. After an interval of not less than twelve hours take out and cut the threads. Carefully remove the upper glass, and push the insect into a saucer of methylated spirit, and after a few minutes it can be lifted and floated on to the surface of some clove oil to clear. Now remove to turpentine for a short time, drain, and mount in Canada balsam.

Parts of insects are mounted in a similar manner. Stings of wasps, etc., can be seized with fine forceps and drawn out with the poison bag intact. Tongues can be pressed out with a firm brush and be then cut off with a slide knife. Sexual organs are treated in a similar way. Eyes are flaked off and cut into small pieces, or they will not lay flat. The jaws, eyes, and spinning apparatus of a spider are shorn off slantwise, and do not require to be pressed. The first two can be included in one object.

Eggs of insects are killed by soaking in benzene, after which they can be mounted dry or in balsam.

HOW TO MOUNT AN INSECT WITHOUT PRESSURE.

Treat as before, but fix the limbs under methylated spirit by means of a needle.

Now take a *tin* cell just deep enough to contain the insect and cement one side. When "tacky," centre it—sticky side downwards—on a warm slide, and press down with a needle till it adheres. When quite dry fill up the cell with Canada balsam till it overflows. Now take the object out of the turpentine, drain it, and immerse in the filled cell. Put it away in a dust-proof place for twelve hours, when a few drops of fresh balsam are added, and a warmed cover glass lowered carefully on top. Press down with a needle and leave to dry.

HOW TO CLEAN SLIDES.

Quick Method.—Take a soft brush, and with chloroform remove the exuded balsam. When dry, centre on the turntable, and cement the cell round. Again leave the slide to dry, and then wash it quite clean with turpentine. Finish off with two or three more coats of varnish.

Method when the Balsam has dried by exposure.—Dip the slide into methylated spirit, and rub away the excess of balsam with a soft rag. Dry with a clean soft cloth and apply three or four coats of varnish.

OBJECTS FOR THE POLARISCOPE

No staining is required.

Fish Scales make fine objects. They are obtained by scraping the fish from head to tail—*not* the reverse way. Place the scrapings in a bottle of water and agitate violently. Pour off the water and add more. Repeat process till the scales are apparently clean. If this fails to remove all dirt, slime, etc., place them in a 10 % solution of caustic potash for one or two hours. Wash thoroughly with repeated changes of water, dehydrate in methylated spirit, clear in clove oil and mount in Canada balsam. Sometimes when scales have been preserved for any length of time in methylated spirit they buckle. In this case soak in water and then press between two slides. Drop into methylated spirit to reharden, cut the thread after a few hours immersion, clear in clove oil, and mount in balsam as before.

Horns, Hoofs, Claws, and Whalebone must be sawn or cut into quite small pieces, which are steeped in a 10 % solution of caustic potash till soft. After removing the potash with water transfer to methylated spirit till required for sectionising, which is done by embedding in carrot. Take longitudinal and transverse sections, clear in clove oil, and mount in Canada balsam.

Fat such as Spermaceti, Stearin, Human Fat, Lard, Acids from Fish Oil, Cotton and Palm Oils, etc., make intensely interesting objects. Place a small portion on the centre of a clean slide and melt under a clean cover glass. Remove from heat, centre the cover glass, and leave to harden. Now clean round the cover glass and seal up with two or three coats of varnish. At any time these objects can be melted in the cell over a spirit lamp, and recrystallization watched under the polariscope.

Cigarette, Bank Note, and other Papers make good polarising objects. These only require to be soaked in clove oil, when they are washed in turpentine and finally mounted in Canada balsam.

Crystals require various treatment:—

(1) If the object will melt under the influence of heat, place a small portion on the centre of a slide and warm on a brass slab over a spirit lamp. Directly fusion is complete apply a warmed cover glass, press down, and leave to cool. Scrape off or clean away exuded material, and close up with cement.

(2) Another method. Make a saturated solution of the crystals required in distilled water, using heat if necessary, and add a few drops of gum water on a small piece of gelatine. Mix well and filter. Apply a few drops to some cover glasses fixed to a slide with the breath, dry a few naturally, away from dust, and some by gentle heat over the brass table. When evaporation is complete apply a few drops of balsam to the centre of a slide, take up the cover glass, reverse it on to the balsam, and put away to dry after pressing carefully down.

(3) Make a saturated solution in distilled water and drop some into pure alcohol when the crystal will at once form. Take some up with a dipping tube, drop on to a cover glass, allow to dry, and reverse on to some Canada balsam on a clean slide.

Note.—Some crystals melt in Canada balsam. In this case make a cement cell. Apply another coat of varnish and when nearly dry fill up the cell with castor oil and reverse the cover glass on which the crystals have been formed on to the sticky edge, press down, and leave to dry. Now wash away exuded oil with turpentine and close up the cell with one or two coats of varnish.

Many substances require special treatment—salacin for example. In this particular case melt a little on a slide (washed previously in ammonia) on a brass plate and take the slide up in a pair of forceps and heat gently over a spirit lamp. It will turn greasy looking, and out of this crystals gradually form. Apply a few drops of Canada balsam and put on a cover glass. Clean and finish off slide in usual way.

Starches are obtained by scraping the root or tuber. The scrapings are agitated in water and then strained through fine muslin. The starch granules pass through while all fibrous material is held back. With a pipette or dropping tube place some on a cover glass and put away in a dust proof spot to dry. Add some Canada balsam and mount in usual way.

To mount starches in situ harden the stem, tuber, or root in methylated spirit for a week, sectionise, dehydrate, clear in clove oil, stain if necessary, and mount in Canada balsam.

THE PREPARATION OF A FEW SPECIAL OBJECTS.

Stomata.—Cut up the leaf into pieces $\frac{1}{4}$-inch square. Boil them in nitric acid in a test tube, and after adding a few grains of chlorate of potash bring to the boil again. Remove all traces of the acid by washing with repeated changes of water. The epidermis is then found to be quite clean and can be bottled in methylated spirit till required.

Stain in a 1 % solution of methyl-analine violet in distilled water for five minutes. Then wash in a ½ % solution of glacial acetic acid to remove excess of colour. Wash away all trace of acid and mount in glycerine jelly. This is done by melting the jelly in a water bath and dropping a little on to the centre of a *warm* slide. Place object in the jelly, cover up, and leave to cool. To clear off exuded jelly drop the slide into cold water for a minute or so and with a penknife scrape the jelly away. Wash the slide in water and then with methylated spirit. Dry with a cloth and cement up.

Hairs of Animals.—Soak for some days in turpentine to get rid of all air, and then mount in Canada balsam or glycerine jelly.

Polycistinous Earth.—Break into small pieces and boil for some hours in a strong solution of common washing soda. Pour off debris from time to time till all the earth is broken down. Wash all soda away and boil in nitric acid for 20 minutes. Wash acid away and bottle up in distilled water. With a dipping tube drop some on to a slide over a heated brass plate, and when dry shake off on to a piece of platinum foil or capsule and heat to redness. The objects are then ready for mounting in Canada balsam or opaquely.

Crystals of Silver.—Make a 1 % solution of nitrate of silver. Place a drop on the centre of a cover glass affixed by breath to a slide. Add a speck or two of copper filings, when the crystals will form. Drop the cover glass next day into a large cell fixing to the bottom with a little gum water. Press out air bubbles. When dry apply a coat of varnish to upper surface of the cell, and when this is nearly dry put on the cover glass.

Students will soon learn how to manipulate any object that comes to hand. If one attempt to mount it proves a failure the only thing to do is to experiment until the proper treatment is found out. A log book should be kept in which should be entered for reference every result, whether negative or otherwise.

The author wishes, in conclusion, to express his gratitude to his tutor, Mr. Martin Cole, of Haverfield Gardens, Kew, for his unfailing kindness and the trouble he took to make himself clear on all points during a course of instruction which led to the writing of this article.

A. G. Scorer, M.R.A.C.

LITERARY AND DEBATING SOCIETY'S ENTERTAINMENT.

The annual dramatic entertainment given by the above Society took place on Wednesday, December 2nd. It is a pity that the girls' parts were not taken by ladies, but it is to be hoped this defect will soon be remedied. By this, it is not meant that the girls' parts were badly acted, on the contrary, but the writer thinks it is on the same level as girls playing principal boys' parts. However, it no doubt adds to the amusement of the performance when the collegers see their own colleagues dressed up as girls!

The first piece was a farce entitled

"THE DUCHESS OF BAYSWATER & CO."

Dramatis personæ.

Sir Jeremy Joles	Mr. T. H. Plumer
The Duke of Bayswater	Prof. Drysdale Turner
Caryl Stubbs	Mr. G. B. Pease
Jenkyns	Mr. E. Ash
Kathleen Joles	Mr. W. Blake
The Duchess of Bayswater	Mr. J. Hartnoll

It is a farce, and nothing but a farce, the main plot being to overcome the scruples of an old invalid gentleman, Sir Jeremy Joles, about business being an essential part in the life of the nowadays aristocracy. His daughter Kathleen wishes to marry Caryl Stubbs, whose father made his money in tinned-meats. This marriage Sir Jeremy will not hear of. The Duchess of Bayswater and her son, the Duke, come to stay in the hotel where Sir Jeremy is taking his cure, and Sir Jeremy is introduced to them. He is immensely shocked to hear the Duke and Duchess talking nothing but "shop," but is eventually persuaded to let Kathleen marry Caryl, a side issue of the play being a purely business proposal of marriage by the Duke, the object of furthering his business being Kathleen.

Mr. Plumer made a great effort in the part of Sir Jeremy, but it was a pity he could not pitch his voice a little lower.

Mr. Hartnoll, as the Duchess, considering it was his first appearance on the stage, gave a most creditable performance, speaking his lines well, and bringing out his points with effect.

The part of the Duke was very realistically played by Professor Drysdale Turner, who was evidently well up in advertising, but it would have been better if he had a little more control over the movements of his hands.

Mr. Blake, as Kathleen, was truly feminine, and made up very well as a girl.

Caryl Stubbs was fervently played by Mr. Pease, but it was a pity his voice was not more under control.

The part of Jenkyns was played creditably by Mr. Ash, who had to undergo some severe language from Sir Jeremy.

During the interval Mr. von Meck, dressed as a Cossack, sang two Russian songs very nicely, and Mr. A. Blake gave two comic songs.

After the interval, the second piece given was

"MY LORD IN LIVERY."

Dramatis personæ.

Lord Thirlmere	Mr. H. Maddocks
Spiggot	Mr. T. H. Palmer
Hopkins	Mr. R. S. Brander
Robert (the smallest buttons obtainable [?])	Mr. A. C. Arden
Laura	Mr. H. S. Sarson
Rose	Mr. D. Gilmour
Sybil Amberley	Mr. K. Gilbert

Miss Sybil Amberley and two girl friends are found sitting in the schoolroom at Miss Amberley's home on the day a new footman is expected. Miss Sybil receives a letter from a midshipman friend, saying that one of the Lieutenants of his ship, Lord Thirlmere, who is home on leave, made a wager that Miss Sybil will give him her rings within half an-hour of making her acquaintance. The ladies, thinking that the new footman Hopkins, who appears, is Lord Thirlmere in disguise, dress up as the cook, housemaid, and lady's maid, but then find the new footman is really the new footman. Changing back to their proper personalities; they snub Hopkins, making him only too ready to change places with Lord Thirlmere, who arrives, and is taken by the nervous old butler, Spiggot, for a burglar, and in the capacity of footman Lord Thirlmere robs the unprotected ladies of their jewels, amongst them Miss Sybil's ring, thus winning his bet.

Mr. Gilbert, as Sybil, was very good in speaking his lines and making the most of his part, but it was a pity he was allowed to rock from one leg to the other, and hold his hands in an unnatural position when talking. His make-up was not all that could be desired, as he was made much stouter than necessary, and his wigs had a grown-up fringe with a "flapper's" tail.

The parts of Laura and Rose were effectively played by Messrs. Sarson and Gilmour, the former making up very well as a girl, but it might have been better if all the girls had been allowed to have some needle-work or something, instead of merely playing with their pocket-handkerchiefs.

Mr. Palmer gave an excellent rendering of Spiggot, the butler, although he was evidently nervous at starting, and some of his lines could not be distinctly heard.

Mr. Brander gave a clever impersonation of Hopkins, the real footman, but Mr. Maddocks, as Lord Thirlmere, was hardly convincing enough, the burglary scene being rather tame.

Mr. Arden did all that he was wanted to as the precocious buttons.

It was noticeable that the movements of every member of each caste had not been studied with that degree of intelligence that one would have liked to have seen.

Thanks are due to Professor Duncan for producing the play, to the gentlemen who acted as stage carpenters, and to Mr. Mansell-Pleydell as chief scene shifter, in the performance of which onerous duty he, no doubt, stood by and looked on.

Mrs. Russell Swanwick received the guests; a very pleasant evening was spent, and the audience was very enthusiastic.

After the performance Professor Ainsworth Davis, the Principal, entertained the guests in his house.

FORESTRY DEPARTMENT AND BOTANIC GARDEN.

We acknowledge with thanks the gift of an excellent and valuable collection of Conifers from Messrs. W. Treseder and Son, of Cardiff. A representative collection will be planted in the Forest Garden, others in the Botanic Garden.

R.A.C. STEEPLECHASE.

This event was held on Friday, December 4. It had been decided to endeavour to run the race over a five-mile point from Ashton Keynes to the College, the competitors to be allowed to select their own course across country, running on the roads to be forbidden. With this object in view the permission of the farmers, over whose land competitors were likely to pass, was sought and most readily and generously granted, and Mr. and Mrs. Plumbe came out to watch the race and give encouragement.

Eight starters lined up in Mr. John Freeth's field at Ashton Keynes. It was soon evident that there was a diversity of opinion as to the most direct route, the runners crossing each other at right angles in the third field. Maddocks had evidently studied the matter, however, and combining his knowledge with a swift pace and an excellent staying power won easily in thirty-seven and a half minutes, Murland arriving second, and Plumer third.

The going was rather heavy and the day misty (one unfortunate person nearly reaching Kemble before discovering his mistake), but altogether the new method was a great success. The competitors derived more enjoyment from the alteration than the spectators, so probably next year we shall see all the College at the starting post.

R.A.C. OLD STUDENTS' CLUB.

The annual dinner took place on Wednesday, December 9th, Mr. E. J. Cheney in the chair. We hope to give an account of the proceedings in our next issue.

DIPLOMA EXAMINATION.

Mr. Gerald Noel Sowerby obtained a Diploma of Membership as the result of the examination at the end of last term. Mom Chow Bhunsri obtained a Certificate of Associateship. The External Examiners were Mr. W. McCracken in Agriculture, Dr. J. A. Voelcker, F.I.C., in Agricultural Chemistry, and Professor H. Robinson, M.I.C.E., in Surveying and Engineering.

SCHOLARSHIPS.

The First Scholarship last term was obtained by Randle William Carr, the Second by William Girvan Wright, and the Third by Hari Krishna Lal. Peek, Margesson, Levenfeld, and Gilbert received Honourable Mention for Scholarships.

OLD STUDENTS.

Mr. F. H. Osmond Smith, M.R.A.C., has been appointed Estate Agent for the purposes of the Small Holdings Act to the Glamorganshire County Council.

MUSEUM. FORESTRY COLLECTION.

The above collection is being re-arranged and fresh exhibits are required. It is hoped that old Students will kindly assist in making the collection as interesting and complete as possible. Specimens of timber with any special particulars of where and how grown, of shakes, injurious insects, fungi, or damage done by mice, rabbits, or other animals: or the good and bad effects of pruning will be much appreciated. The department will be pleased to identify any specimen sent in, and also to suggest treatment if desired.

THE COLLEGE HERD.

We are glad to record that the College Herd is free from tuberculosis. It was tested in October by the Professor of Veterinary, and two cows, an Ayrshire and a Shorthorn, reacted to the tuberculin test. The authorities determined to have a sound herd and so decided on the slaughter, and burial, of these two cows. Two new cows, Shorthorns, have since been purchased, both of whom were subjected to the tuberculin test, and passed, before they were admitted to the Herd. We now possess eleven cows giving milk.

OBITUARY.

We regret to record the death of Arthur Frederick Griffiths (R.A.C. 1881-2), which occurred at The Grange, Bishop's Cleeve, near Cheltenham. He was captain in the Cheltenham Engineer Volunteers and took a very active interest in the parish matters of Bishop's Cleeve, where he was greatly liked. *Ætat* 47.

We regret to record the death of Albert Leonard Pilkington (R.A.C. 1889-1891), at Erbistock Hall, Ruabon, *ætat* 36. Mr. Pilkington was in both the Cricket Eleven and Football Fifteen in 1891.

CHLORINE IN RAIN WATER.

The rainfall for the six months ending September 30th was 12·91 inches falling on 81 days; it contained on an average chlorides equivalent to ·388 grains of sodium chloride per gallon, equal to a deposit of 16·09 lbs. of common salt per acre.

For the twelve months ending September 30th the rainfall was 32·07 inches, falling on 178 days, and containing chlorides equivalent to 40·47 lbs. of common salt per acre. E. K.

RUGBY FOOTBALL.

We are very pleased to record that the R.A.C. has reverted to the Rugby game, which it had played with very considerable success for fifty years up to 1905. Last season we were unable to raise a Rugby team, and tried to play the Association game with but indifferent success. This season, with the advent of a large class of freshmen, more of whom played Rugby than Association, it was resolved to resume the Rugby game. Of course there was some difficulty in obtaining suitable fixtures at the twelfth hour, but mainly through the energy of E. Mansell-Pleydell and W. Ward, several matches were arranged and excellent games resulted.

R.A.C. v. St. Paul's College.—Played on St. Paul's ground, Cheltenham, October 28th. This was the opening match of the season, resulting in a win for the R.A.C. by 13 points to 3 (2 goals and a try to a try). St. Paul's scored first, but did not convert. By hard forward work the game was kept well in the opponents' ground, and following on a three-quarter run, Arden got through. Ward converted. Shortly after this Ward scored, but failed to convert. From a scrum close on the opponents' line Battersby cleverly scrambled through and scored. Ward again converted. Though we continued to press them till the end of the game, no more scoring was done. Team: Sabit; Ovens, Stewart, Arden, Clapham; Wright, Battersby; Ward, Mansel-Pleydell, Brander, Lane. Homfrey, Verney, Sinha, Casey.

R.A.C. v. Cheltenham A.—This match was played on Wednesday, November 4th, and resulted in a win for the visitors, the score being 26 points to 3. Cheltenham brought over a very strong team, no less than seven of their first xv. playing. The College were without Ward, whose knowledge of the game would have made him invaluable amongst the forwards. It was entirely a forward game, and was at times very fast. The College showed promise of considerable improvement, but found their opponents too heavy for them. Wright and Battersby played well behind a beaten pack, and the three-quarters did what work came their way in a creditable manner. It is hardly fair to single out any of the forwards, as all worked hard. Mansell-Pleydell kept the pack together, and seemed everywhere, and Verney, who scored, and Lane, until he was unfortunately injured, were prominent. The score must be considered in conjunction with the fact that after the first 15 minutes the College practically played two men short, as Cope, although he very pluckily came back after half-time, was badly hurt and could do very little. Team:—Back, Sabit; three-quarters, Ovens, Arden, Stewart, and Cope; halves, Wright and Battersby; forwards, Mansell-Pleydell, Brander, Lane, Sinha, Casey, Homfray, Verney, and Maurice.

R.A.C. v. Cheltenham College.—Played on Wednesday, November 11th, at Cheltenham, and lost. The following represented the College:—Sabit, back; Ovens, Sinha, Arden, Stewart, three-quarters; Clapham, Wright, halves; Ward, Mansel-Pleydell, Prof. Pritchard, Brander, Lane, Maurice, Homfrey, Verney, forwards.

R.A.C. v. Cheltenham Athletic.—This match was played at home on November 18th, and resulted in a win by a goal (5 points) to a try (3 points). Verney scored for us by following up a kick and rushing it over. Ward converted. The forwards played a keen game and more than held their own, Mansel-Pleydell being conspicuous for his dribbling and Ward for his great use in the scrum and out of touch. At half Battersby played a good game, and among the three-quarters Stewart was very useful in defence. Team: Sabit; Stewart, Arden, Sinha, Clapham; Battersby, Wright; Ward, Mansel-Pleydell, Prof. Pritchard, Brander, Lane, Homfrey, Verney, Casey.

The College XV. consists of: Wright, Ward, Mansel-Pleydell, Battersby, Brander, Verney, Lane, Sabit, Casey, Stewart, Arden, Clapham, Ovens, Homfrey, Sinha; of whom the first seven have received their colours.

R.A.C. BEAGLES.

The meets this season were as follows:

Saturday, October 10th, at the College, Mr. R. Swanwick kindly giving us permission to go over the College Farm.
Wednesday, October 14th, at Siddington, by invitation of Mr. J. Farmer.
Saturday, October 17th, at Preston, by invitation of Mr. J. Adamthwaite.

Wednesday, October 21st, at Poulton, by invitation of Mr. Bert Hill.
Saturday, October 24th, at Cotswold Park, by invitation of the Rev. J. Priestley Foster.
Wednesday, October 28th, at Ranbury, by invitation of Mr. W. T. Stevens.
Saturday, October 31st, at Norcote, by invitation of Mr. H. Pullin.
Wednesday, November 4th, at Woodmancote, by invitation of Mr. R. Stuart.
Saturday, November 7th, at Charlton Park, by invitation of the Earl of Suffolk and Berkshire.
Wednesday, November 11th, at Latton, by invitation of Mr. S. Dennis.
Saturday, November 14th, at Wiggold, by invitation of Mr. Walter W. Cole.
Wednesday, November 18th, at Ashbrook, by invitation of Mr. H. R. Cole.
Saturday, November 21st, at Quelfurlong, by invitation of Mr. Robert V. Large.
Wednesday, November 25th, at Bibury Court, by invitation of Mr. R. B. Cooper.
Saturday, November 28th, at Syde, by invitation of Mr. J. D. Crewdson.
Wednesday, December 2nd, at Meysey Hampton, by invitation of Mr. J. T. Hobbs.
Saturday, December 5th, at Salperton Park, by invitation of Mr. G. L. Foster Harter.
Wednesday, December 9th, at Ashton Keynes, by invitation of Mr. J. D. Gouldsmith.
Saturday, December 12th, at Baunton, by invitation of Mr. Fred. W. Cambray.

The staff of the Beagles has been Mr. H. Maddocks, master; Messrs. G. R. J. Corbett, T. H. Plumer, and J. Hartnoll, whips; and Mr. E. W. Margesson, secretary.

Ten hares have been killed this session up to the time of going to press, December 7th, which is we believe a better record than has been achieved for many years.

For the first time, we believe, in the history of the pack, we have had a kennel huntsman. The expense has been defrayed by a donor who desires to remain anonymous. This has relieved the master and whips of much menial work, and has enabled them to devote more time to their College studies. The College has been lucky in securing the services of Mr. W. Bodington as their kennel huntsman, his ripe experience and knowledge of hounds has proved invaluable to the pack.

A motor has also for the first time been placed at the disposal of the Beagles to take hounds to the meets. This has effected a great saving of time, and is much appreciated by all including the hounds, who have grown quite fond of it.

Several new hounds have been presented to us. The donors include the Messrs. Dobson and Mr. E. V. Cope, who, though past students, are constantly out with us. These hounds have strengthened the pack and greatly increased its efficiency.

Where all have done their best to help us we feel it would be invidious to describe the doings of one day rather than another, and space forbids our describing them all. Accounts of many have also appeared in the *Wilts and Gloucestershire Standard.*

Mr. J. D. Crewdson, an old student at the College and a loyal supporter of the Beagles, has recently been married, and the members of the Beagle Hunt took the opportunity when the Beagles met at his house at Syde to present Mr. and Mrs. Crewdson with a silver-mounted inkstand and a silver sugar bowl, with a suitable inscription, as a small wedding present, and as a token that his kindness to us has not been forgotten.

The thanks of the College are offered to the landlords and tenants who have so kindly allowed the Beagles to run over their land, and who have extended such generous hospitality to the followers of the Hunt.

REVIEWS.

New Developments in Poultry-Raising. By Helen Strathmore. Part 1, Lampless Chicken-Brooders; Part 2, Home-raised Poultry Feeding Stuffs. The Highview Press, Gomshall, Surrey. 1/6 net.

This pamphlet contains some new and original ideas on the raising of poultry. The author's remarks on foster-mothers are interesting, but do not bear out the experience of many poultry keepers. That the initial cost of reliable foster-mothers places artificial incubation beyond the power of small holders is without doubt true, but it is questionable whether the author is right in affirming that such a high percentage of chickens are lost by the majority of those using foster-mothers. Care *is* needed with a lamp-heated foster-mother, but evidently considerable trouble is also needed with the brooder advocated, that requires bottles to be filled with boiling water three or four times a day. The lampless brooder of this pamphlet seems a good and practical article, inexpensive, simple of construction—capable of keeping chicks sufficiently warm at an earlier age than most brooders on the market. Part 2 of the pamphlet deals with home-raised food stuffs and gives a long and varied list of cereals and fruits that can be used beneficially for laying hens. If a proper account were kept of the labour employed in their growth, collection, and preparation, it is doubtful whether it would show much profit to the poultry keeper. The theory seems right: a bird naturally feeds on all varieties of foods, and to feed it only on corn and meal, meal and corn is unnatural. But, how much variety can be given with a due proportion of return for the extra labour involved is a question that only experience can tell.

How to Attract and Protect Wild Birds. By Martin Hiesemann, translated by E. S. Buchheim. With an introduction by Her Grace the Duchess of Bedford. London: Witherby and Co., 1908. 1/6 net.

This little book is a description of the system of the Baron von Berlepsch for the preservation of useful birds, which has been applied by him with great success at the experimental station at Seebach. The main features of the plan are the provision of suitable nesting places, especially for such birds as nest in holes; growing and pruning bushes so as to provide good sites for the nests of warblers; and feeding in winter. The birds most benefited are those most useful to agriculture and to forestry. Several illustrations are given of the appliances and devices used. We cordially recommend the little treatise to all bird lovers, and to the agriculturist as bringing to his notice a source of profit as well as pleasure.

Crops and their Cultivation. By Primrose McConnell. Cassell and Co., 1908. 1/- net. 8vo., pp. xii. and 116.

This is the second volume of a series to be known as "The Complete Farmer," being brought out by Messrs. Cassell and Co. The first volume is on Soils. The author, a well known teacher and practical farmer, has endeavoured to bring the information in this little handbook up to the latest date, and he has admirably succeeded. Although in a book of this size it is impossible to enter into every detail, Mr. McConnell has made an excellent selection and observed a due sense of proportion. We heartily recommend the work to the attention both of agricultural students and of farmers.

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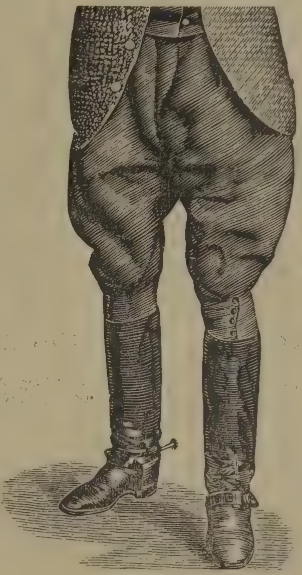

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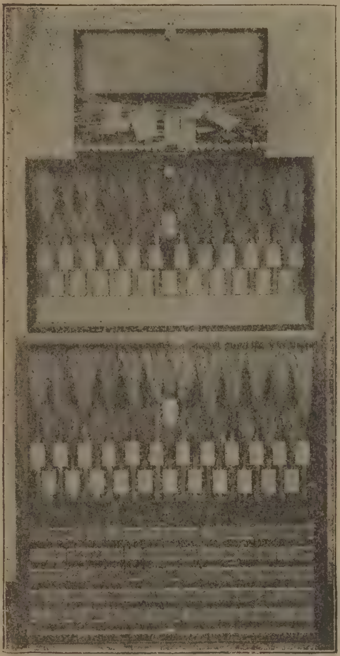

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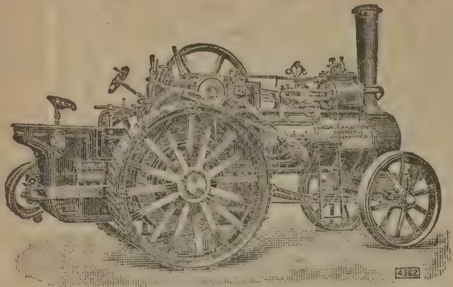

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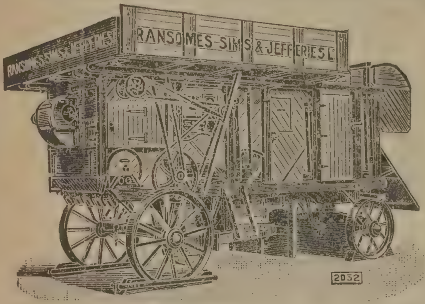

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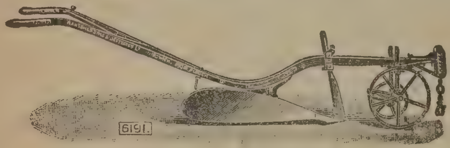

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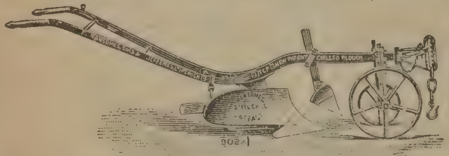

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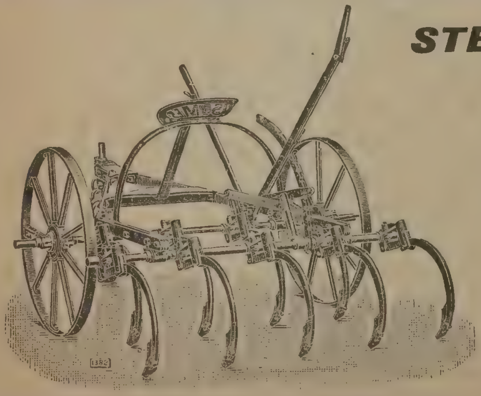

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Vol. XV. AUGUST, 1911. No. 4.

SOME NOTES ON THE FINANCE ACT, 1910, MORE ESPECIALLY IN REGARD TO SITE VALUE DEDUCTIONS.

By E. A. Stapledon, M.R.A.C., F.S.I.

A Paper read at the Devon and Cornwall Provincial Committee of the Surveyors' Institution, February, 1911.

[*Continued from page 87.*]

You are all so familiar with the procedure of the Commissioners of Inland Revenue as to serving the provisional valuations upon owners and providing copies on request to persons interested in the land, the 60 days objection limit, and appeal by an objector against the valuation proper to one of the panel of specially appointed Referees and from him to the High Court, or to the County Court if the land is valued at not more than £500, that no comment on these seems needed. It should be borne in mind, however, that any such judgments will in all probability be binding on *all* parties concerned, so that we should keep very wide awake with regard to properties in which we may have clients interested as beneficiaries or mortgagees.

A matter of the greatest moment to very many of us being the position in which agricultural land stands with regard to the new duties, it is a satisfaction to find that only two of these, namely, *Increment Value Duty* and *Undeveloped Land Duty* have any direct bearing upon it. Agricultural land being defined as *including* the use of land for various purposes of husbandry and woodlands, we may, I think, safely presume that arable, though not specifically mentioned, is intended to be included. As regards *Increment Value Duty*, agricultural land is entirely exempt provided that it has no value other than for agricultural purposes, or if it has any other value such value is less than the agricultural one, or if having a higher value it was immediately before the occasion in the owner's occupation provided the " total value " of such land does not exceed £75 per acre, and the total area of ownership does not exceed 50 acres. On the other hand, immediately the value for other purposes passes the value for agriculture, it becomes liable to Increment Value Duty to the full extent of its then total value, no relief being given off this in respect of the purely agricultural value.

As regards *Reversion Duty*, it is exempt whatever its value for extraneous uses so long as it is used for agricultural purposes at the time of the determination of the lease.

As regards *Undeveloped Land Duty*, all land, agricultural or otherwise, is exempt if its original, or, after 1914, periodical value does not exceed £50 per acre, and when exceeding that sum it obtains relief to the extent by which its value as a building site exceeds its value for agricultural purposes only.

I may also touch in passing on the special importance to the landed interest of *Part III.*, which provides for a higher and more extended scale of Death Duties as set out in the Second Schedule to the Act; doubles the Settlement Estate Duty to 10 per cent.; increases the Legacy and Succession Duty where formerly 3 per cent. to 5 per cent., and where formerly 5 per cent. or 6 per cent. to 10 per cent.; increases the period for exemption of gifts *inter vivos* from paying duties from one year to three, and unfortunately abolishes the 25 years' purchase limit for Death Duty valuations of agricultural land, as provided in S. 7, S.S. 5, of the Finance Act of 1894, except as to farms let on a tenancy from year to year: this is a point to be remembered when settling new tenancies of agricultural holdings. Part III., S. 61, S.S. 5, also varies the procedure and incidence of Death Duties on timber by cancelling the inclusion of timber values on agricultural lands in the 25 years' purchase limit under the Finance Act of 1894, and providing that all timber values shall be aggregated to ascertain the value of the estate for dutiable purposes, though the duty shall not actually be payable until the timber is cut.

Part IV., while it imposes upon some of our clients the annual super tax of 6d. for every £ of the amount by which their total income exceeds £3,000 (this tax, I fear, will hardly fall on many of us personally) gives an appreciable relief to earned incomes, a facetious relief to parents, and at last some measure of long needed justice in respect of deductions for repairs under Income Tax "Schedule A," which latter can also be added to any claims for repayment of super tax, though not, I believe, eligible for purposes of reducing the total income below super tax watermark. I may here note that license compensation charges are not allowed as deductions for super tax purposes.

The relief now given under Schedule A consists of a repayment of the tax paid on the sum (not exceeding, however, in the case of land one-eighth, and houses under £8 Schedule A assessment one-twelfth of the tax on an amount equal to the annual value under Schedule A, so bringing the maximum allowance to $\frac{1}{4}$ for both land and houses) by which the actual expenditure on maintenance and repairs, (including fences, gates, and roadways, but excluding planting or replanting of woodlands), insurance and management according to the average of the preceding five years has exceeded the customary statutory deduction for repairs, but the cost in respect of cottages not exceeding £8 Schedule A assessment must, in consequence of the differentiation in allowance, be kept separate from cost in respect of the rest of the estate, and expenditure upon dwelling houses of over £8 annual value and not being *bona fide* farm houses must be entirely eliminated. Fortunately this claim can be extended to three years in a precisely similar manner to the claims for return of tax on life insurance premiums, but the claim form is at first sight a somewhat alarming document. Claims cannot now be made for any financial year prior to that ending April 5th, 1910, but the actual limit of time for the making of the claim extends forward to three years—" for which relief much thanks ! " The five years for average of expenditure would, however, be retrospective and for a claim for 1909-10 would be for a five years' period ending March 31st, 1909, or if the yearly estate accounts were customarily made up December 31st (or any other regular date prior to the commencement of the financial year in respect of which the claim for repayment is made) the average of five years up to such date would be accepted. Apparently the intention of the Act is that Surveyors of Taxes shall not be unreasonable in the matter of production of accounts and vouchers provided they are satisfied of the *bona fides* of the applicants, and I need hardly say that in every case where a member of this Institution is concerned there must be every reason for this to be so.

Instructions for computing the five years' average are fully set out in Section 69 (5).

Part V., among other provisions, doubles the stamps on conveyances exceeding £500, and upon gifts *inter vivos*, and on leases comprised in the first schedule of the Stamp Act, 1891, thus not affecting the stamps on mortgages, nor the 5s. stamp on counterparts.

Turning now more particularly to the question of Site Value Deductions, it cannot be too strongly emphasised how little dependence can be placed upon generalities, and how greatly the circumstances and conditions of each particular case must, when alternative courses present themselves, determine the procedure to adopt. It will, I venture to think, tend to a better understanding and go far to allay friction both with the Government valuers and officials with whom we may be brought in contact, and also lessen the feelings of irritation set up in our own minds by the bewilderments and sweet unreasonableness of some of the provisions of the Act, if we concede that there really is a *bona fide* underlying intention that no purely agricultural land and no part of the value of land which is due to the prudent expenditure, initiative, and energies of the owner shall be subject to taxation. I advisedly say prudent because, and rightly so, it is only *prudent* expenditure, initiative, and energies that can in so many cases be taken into account for the purpose of deductions, and I would draw your particular attention to the fact that in the case of value derived from works or capital expenditure to improve the land for business purposes other than agriculture, or from appropriation of land for public streets, etc., or from redemptions, enfranchisements or cancellings of depreciatory covenants it is the "value *directly attributable* to expenditure, etc.," that is directed to be deducted, whereas in the case of divestment of buildings, structures, or growths, it is, in appropriate cases, the *cost* of divestiture, and in the case of land on which £100 per acre or any multiple thereof has been expended on forming roads and sewers it is the *actual expenditure* itself which gives rise to exemption.

The Site Value Deductions are divided into two clearly defined classes:—firstly, those which are *obligatory* both upon Valuer and Valuee (if I may coin such a word) whether claimed or not, consisting of (a) that part of the gross value which is due to the presence of the buildings, etc., of which the land is to be divested, and (b) the cost of divestiture, and secondly, the *discretionary* or those which the owner is under no express obligation to claim, namely, any part of the total value attributable to works or appropriation of land for public use, or attributable to redemptions, enfranchisements, or releases from respective covenants. This question of deductions brings us face to face with Form VII., the filling up of which, though voluntary in so far as no mandate is issued by the Government for its return, is of the greatest importance as furnishing important data for correct valuation. At the same time it appears to be a matter of very questionable advisability (when, by intention, no values have already been furnished in Form IV.) to now practically go for a reversal of policy by supplying estimates of value in Form VII. The general consensus of opinion with regard to Form IV. has undoubtedly been to let the Government Valuers first show their hand. How far this policy is right the issue alone can show. I cannot but think, however, that the Valuers, being after all but human, will, with the enormous task before them, be led to follow in some measure the line of least resistance and will not hold aloof from, or unreasonably view, any estimates furnished with fairness and *bona fides*, and such a feeling between the Valuer and the Valuee or his representative can alone, to my mind, render the Act workable.

Taking now the sundry deductions and points connected therewith *seriatim*: *Expenditure of a Capital nature.* There does not appear any necessity that the money expended should actually have come out of Capital, the criterion in this case being the character of the works, not the source of the funds expended, nor is there any limit of time or place provided value has been contributed thereby to the land in question.

One point to be emphasised, obvious though it be, is that it is not the *amount* of the expenditure that is the subject for a deduction but the value directly attributable to it, and for his client's advantage the object of the owner's Valuer will be to show that the value due to expenditure incurred since the original valuation plus the growth of the value due to expenditure before such valuation is abreast of the apparent increment value less an amount equal to 10 per cent. of the original site value or of the site value on the last preceding occasion as the case may be because it is evident that such expenditure or its growth in value must have been the cause of the increment.

"*Person interested in the land*" may for this purpose probably be held to include a predecessor in title or a former lessee as well as an owner in fee simple and mortgagor. It is, however, necessary that the works or expenditure shall have been made strictly within the limits of the words quoted in S. 25 (4), and this may be extended to give to a purchaser of land adjoining his existing property the right to claim on an occasion arising after his purchase a deduction in respect of value accruing to the purchaser due to the expenditure made by the purchaser upon his original property which could not have been claimed by the former owner of the land purchased. An interest in land is for general purposes defined in Section 41 and does not include a leasehold interest not exceeding 14 years, nor does it include a mortgage, though under S. 27 (5) a mortgagee can be served with a copy of the provisional valuation and has power of appeal, but only prior to the settlement of the final valuation.

It is now and henceforward of the greatest importance to keep an accurate geographically detailed account of all estate expenditure on agricultural improvements, as though such expenditure may only by a side issue have improved the land for building purposes the resultant value will be none the less deducible. On the other hand no deduction is allowable in respect of works or expenditure for agricultural improvements until and unless the land becomes building-land benefited by such expenditure.

As to the expediency or otherwise of claiming discretionary deductions, it will be necessary in all cases to consider whether the subjects of deduction are likely to increase or decrease in value, and the question for us to ask ourselves in every case is "Is it to our client's advantage to claim the particular deduction, or is it not?" If so, then it must be estimated fully, properly, and with all possible accuracy so as to satisfy the Government Valuer, whose duty it will be to see that this is done. The greatest scope for skilful answer to this question lies where the deduction is one for "assessable site value," as this differs from the other three values in being merely a taxable entity with no relation to existing things: it cannot, therefore, be tested by physical conditions and its amount is consequently largely in the discretion of the Valuee, who may by claim or omission of discretionary deductions produce a high or low result as he may prefer; it would appear in fact that the same piece of land may without prejudice to the respective assessments be given two differing site values, one for undeveloped land duty and another for Increment Value Duty.

We may leave out any consideration of "Death Duties" as "total value" will be found the best guide for assessment of these.

"Reversion Duty" may also be neglected, this also being based entirely on comparison of total values.

For purposes of "*Undeveloped Land Duty*" it appears obvious for reasons above expressed that the lower the site value the better it is for the owner, at any rate until the high-water mark of exemption is passed; its other influences, however, are of great moment both owing to the ease with which when once imposed the duty may be increased under future legislation, and to the fact that when a greater than agricultural value now exists but the development period is uncertain or far distant this duty will be of certain continuance at any rate for some considerable period. There will also probably be a difficulty in freeing land once ear-marked as liable to undeveloped land duty from future liability at the quinquennial re-valuations although the expected development may not have taken place.

As regards *Increment Value Duty*, it must always be borne in mind that the deduction which goes to reduce original site value will equally go to reduce subsequent site value, whence it follows that any increment value will be entirely unaffected in amount (apart from the operation of the 10 per cent. allowance) whether a particular discretionary deduction is made or not, that is presuming the same amount is claimable and claimed both on the original and "occasion"-al valuation, as by Section 12 it is provided that no deduction can be claimed on an occasion if it is one which could have been but was not claimed for the purpose of ascertaining the original site value. From these considerations it would appear that so far as increment value duty is concerned the expediency of making a discretionary deduction mainly depends upon whether the resulting value which constitutes the deduction proves to be an increasing or decreasing value.

The relative burden of Increment Value Duty and Undeveloped Land Duty will mainly depend upon the use the owner intends to make of the land. Where it is in course of immediate building development, or an early sale is anticipated, Undeveloped Land Duty is of minor importance and Increment Value Duty becomes the principal consideration. When the owner does not intend early sale, or need not sell except on terms favourable to himself, Undeveloped Land Duty assumes greater importance.

As an end to this, I fear, wearisome and inordinately lengthy paper I will briefly summarise what appear to be the conclusions arrived at as to the general mode of dealing with the several deductions.

In the case of *purely agricultural land* it seems evident that opportunities of claiming the discretionary deductions will be fewer than with other classes of property, and furthermore that there is little object in claiming them, especially if without their assistance the site value will not excede £50 an acre, as for Increment Value Duty it can not on an "occasion" have any higher value than its then market value for agricultural purposes only, and for Undeveloped

Land Duty the site value will be either not greater than the value for agricultural purposes or not greater than £50 an acre. In the case of *fully developed land* in urban areas there would also appear to be little object in claiming them for, as regards " Increment Value Duty," unless these deductions increase in amount in the intervals between valuations, the fact that they were deducted will be harmful rather than of value on the " occasion " as the 10 per cent. allowance would operate against a Valuee were deduction made ; and the land being already developed it cannot, of course, be liable for " Undeveloped Land Duty."

As regards *purely agricultural land with a distinct though remote prospect of attaining a value other than agricultural* : all discretionary deductions, except those which have a potential decrease in value inherent in them, should be claimed with the object of minimising Undeveloped Land Duty.

As regards *developed land* : (i.) Discretionary site value deductions should *not* be claimed in respect of " *developing land* " the period of deferment in respect of which is less than (about) nine or ten years, unless (a) by claiming them the land would be *exempted* from Undeveloped Land Duty, or (b) the deductions would have a potential increase in value inherent in them, in which case they should be claimed. (ii.) Discretionary site value deductions *should* be claimed in respect of " developing land " the period of deferment in respect of which is more than (about) nine or ten years, unless they have a potential decrease in value inherent in them, in which case they should not be claimed.

As regards *all* land which has a value for agricultural purposes : Care should be taken to see that the *market value for agricultural purposes is not underestimated, as it will have an important bearing upon the amount of Undeveloped Land Duty.*

In the case of small residential properties in Urban areas the bearing of Section 17 (4) previously referred to under the heading of Undeveloped Land Duty Exemptions is of immense importance conferring as it does complete exemption on land not exceeding one acre in extent occupied together with a dwelling house, and also in cases where the site value of any property consisting of a house and the gardens and pleasure grounds occupied therewith, not exceeding five acres in extent, does not exceed twenty times the annual value of the whole under Schedule A. From this will be seen also the great importance in the future of the annual value under Schedule A.

Generally in cases where no advantage has been taken of the opportunity of furnishing estimates of values, no returns should be made on Form VII. in answer to queries (4) and (8) and only in simple cases, if at all, should any return be made in the space " value directly attributable thereto " in Queries (5), (6), and (7) until after the provisional valuation has been received and consequently the "total value" of which these deductions form part has been declared, as although the Authorities agree, and with reason, that to ensure correct valuation all facts bearing on the case should be disclosed, it has been definitely stated that a Valuee will not be precluded from claiming on receipt of the provisional valuation any deduction omitted to be claimed on Form VII : but do not let your 60th day pass !

We also have an assurance that site value deductions clear to the Official Valuer from facts within his knowledge will be deducted whether formally claimed or not : on the other hand a Valuer can hardly be held responsible for omission of deduction neither claimed nor apparent.

On the general question of the expediency of high or low valuations, I have no hesitation whatever in saying that in all cases of doubt the course to pursue both on grounds of policy and ethics is to give no undue weight to expediency, but to put the value at what is in your own reasoned opinion the fair and honest figure without losing sight of the potency of these original valuations as probable bases of assessment for rates and taxation in the future.

Appendix B.

Section 20. *Mineral Rights Duty, Form* 5.

To be included for payment of duty :

I.—Rent paid direct to a lessor by the working lessees for pieces of surface land demised by the colliery lease and occupied by the lessees for one or other of the following purposes :

(1) Pits, shafts, and adits.
(2) The more or less permanent deposit of waste materials brought out of the mine.
(3) The temporary deposit of minerals brought out of the mine.
(4) The sites of fixed engines, machinery, and screens, and sheds for protecting them.
(5) The sites of offices for the transaction of the working lessee's business.
(6) Railways and sidings.
(7) Storehouses and engine houses, and sheds for the protection of moveable plant.
(8) Staiths, quays, and piers for the shipping of minerals.

II.—An additional annual rent of a fixed amount paid direct to the lessor by certain working lessees which is expressed to be paid on the ground that they are a Limited Company ; *i.e.*, a sum arrived at by ascertaining the premium which would be charged by an Insurance Company for guaranteeing the performance of the lessee's covenants in the event of a winding up, including in particular the covenants to restore damaged surface land to its original state.

To be excluded from payment of Duty :

I.—Rent paid direct to a Lessor by the working lessees for pieces

APPENDIX A.

EXAMPLES OF WORKING OF INCREMENT DUTY REMISSIONS.

HYPOTHETICAL ORIGINAL ASSESSABLE SITE VALUE £1,000.

Let OV stand for "Original Value," V for Value, I for Increment, R for Remission, < for is less than.

Occasion.	Hypothetical Value.	Increment.	Qualifications for and Relationship to Remissions.	Remission.	Amount assessable.	Duty payable at 20°/o
	£	£ £ £	£ £ £	£ £	£ £ £	£
A	1,200	1,200 − 1,000 = 200	AI 200 < (25°/o OV 1,000) i.e. 250	10°/o OV 1,000 = 100	200 − 100 = 100	20
B	1,240	1,240 − A 1,200 = 40	BI 40 < (25°/o OV 1,000) BI 40 < (10°/o A 1,200)	BR = BI = 40	BI 40 − BR 40 = Nil	Nil
C	1,340	1,340 − B 1,240 = 100	CI 100 < 25°/o OV 1,000 CI 100 < 10°/o B 1,240 i.e 124	CR = CI = 100 240	CI 100 − CR 100 = Nil	Nil
D	1,400	1,400 − C 1,340 = 60	DI 60 < (25°/o OV 1,000) DI 60 < (10°/o C 1,340)			
	If D occurs more than five years after A although		R (A + B + C + D) £300 = 25°/o A £1,200 = 25°/o OV £1,000 + £50	DR = DI = 60	DI 60 − DR 60 = Nil	Nil
	If D occurs less than five years after A		R (A + B + C + D) £300 less (25°/o OV £1,000) £250 = £50	£250 − R [A + B + C] 240 = 10	DI 60 DR 10 = 50	10

of surface land demised by the colliery lease and occupied by the lessees for one or other of the following purposes:

(1) Furnaces, kilns, and coke ovens for the partial manufacture of the minerals.

(2) Houses and cottages with or without gardens attached for the residence of the working lessee's employees, and the private streets leading thereto.

II.—Annual sums (usually calculated at the rate of double agricultural value) paid to the lessor's agricultural tenants for the occupation, spoil, or damage of land for any of the ten purposes numbered (1) to (8) above in the left-hand column in pursuance of a licence contained in the colliery lease, *i.e.*, cases in which the agricultural tenant continues to pay his full rent for the whole farm to the lessors, notwithstanding that parts of it cease to be in physical occupation during their occupation by the working lessees for mining purposes.

III.—Sums paid annually to the lessor's agricultural tenants or to the lessor himself in the case of lands in hand for damage caused by subsidence in cases where the mining lease gives an express power to let down the surface upon paying this compensation and the agricultural tenancy agreement contains a corresponding reservation.

IV.—Similar sums paid annually to the lessor's agricultural tenants for the spoil or damage of ground in cases where the mining operation involves the total destruction of the agricultural surface. (This applies especially to freestone and whinstone quarries.)

V.—Payments made by the working lessees to the tenants from time to time by way of compensation for loss of water supply, smoke, damage, etc., through mining operations authorised by the lease.

CORRIGENDUM.—Page 85, 3 lines *from bottom*, for *agreement* read *assessment.*

EXPERIMENTS IN THE POLLINATION OF OUR HARDY FRUITS.

Having had some ten years personal experience and conviction of the value of hive bees in fruit farming, I felt anxious to put the value of bees to the test by excluding them from the blossoms of the various hardy fruits, and also to try to gain some knowledge as to which varieties of apple, pear, plum, and cherry are self-fertile, *i.e.*, will set fruit with their own pollen or pollen of other trees of the same variety, and which varieties are self-sterile, *i.e.*, will not set fruit with their own pollen, but require the pollen of another variety to be brought to them in order to set fruit. This spring Mr. W. E. S. Erle-Drax kindly gave me permission to make use of his beautiful fruit garden at Wye, Kent, for experiments. It is a circular walled-in garden of about four acres, containing a veritable museum of the best varieties of fruit trees, well tended and carefully labelled by his head gardener, Mr. Bond.

In order not to spoil the appearance of the garden, I commenced by using some 200 green muslin bags, but later used about 100 paper ones, placing generally three bags over unopened blossoms on each tree.

The questions I wished to ask the various fruit plants were :—

(1) Can you set fruit without the visits of hive, bumble, and wild bees ?

(2) Can you set fruit with your own pollen ?

(3) Do you set better fruit with the pollen of another variety?

With gooseberry, and red and white currant, I placed two bags over unopened flowers on bushes of each kind ; the flowers in the first bag I left untouched, those of the second I pollinated, with the aid of a camel's hair brush, with their own pollen or pollen from an adjoining bough or bush. In those untouched very few fruits set either in the gooseberries or currants, and those apparently were rubbed by the bag ; in those hand-pollinated, the gooseberries set nearly as well as those in the open, whilst the red and white currants set as well or rather better than in the open. In gooseberries, red, white, and black currants the pollen is globular and viscid, sticking to the anthers so that the pollen can only reach the stigma by mechanical agency, such as bumble and hive bees transferring the pollen from the anther to the pistil. Last year Messrs. Little and Avery, in some experiments in Cumberland, placed muslin hoods over bushes of gooseberry and black and red currants to exclude bees, with the result that whilst the bushes round had excellent crops, the imprisoned bushes produced very little fruit, and that diminutive in size. These berry fruits, unlike many kinds of apple, pear, plum, and cherry, set perfectly with the pollen of the same variety.

Strawberries, provided the weather is favourable, set their fruit nearly as well when bees are excluded by muslin as they do in the open, as the movement of the air carries the pollen to the stigmas ; it appears to be somewhat the same with the raspberry and loganberry, but the fruit is not as a rule quite so large or well developed in those bagged as in those in the open. Hive bees are very fond of raspberry and Loganberry flowers, apparently preferring them to those of the strawberry ; the honey made from raspberry blossoms is very fine. A large raspberry grower recently told me he considered it advantageous to have different varieties of raspberry in a plantation, as the fruit set better where varieties were mixed. I am sure the presence of bees is very important to a cherry orchard in bloom, also that it is advantageous to have different varieties in the same plantation. Out of some twelve varieties of cherries experimented with, of those on which bags were placed over the unopened blossoms only five fruits set ; and of those that were pollinated with their own pollen most of the varieties set no or few fruits, and those that set were generally small ; whereas those pollinated with another variety gave good fruit, better than the average on the tree, and in some cases as good as any on the tree. The Morello, in trials in two different gardens, set no fruit where bees were excluded, but set well where pollinated with its own pollen. This variety did not seem to be benefited by pollen of another variety.

With plums, out of eleven varieties tried, only two kinds set any fruit where bees were excluded, viz., Victoria and Czar (the latter only setting a single fruit). Of eleven kinds pollinated with their own pollen only five varieties set any fruit, whereas when pollinated with pollen of another variety in nearly all cases the fruit was good and plentiful.

In pears and apples it seems as if fully two-thirds of the different varieties are absolutely self-sterile, *i.e.*, will set no fruit when pollinated with their own pollen. Some varieties will occasionally set fruit with their own pollen, and probably only about one in eight will set fruit regularly with its own pollen. As a general rule almost all varieties set more and better fruit with foreign pollen, and in the self-sterile varieties no fruit matures unless foreign pollen reaches the stigmas; this fact probably accounts for many unproductive trees, especially where isolated.

Out of some sixty varieties of apples tried, only ten set fruit where bees were excluded, and only twenty set fruit where pollinated with their own pollen.

Out of sixty-four crosses, some forty-eight were successful, producing generally good apples, in some cases equal to the best on the tree; those that missed were in most cases pollinated too late, when the petals were falling. In apples early pollination seems to give the best results, the stigmas can be pollinated with good results shortly before the buds would naturally open.

For most of the crosses I did not take the anthers out, but with the trials on Cox's Orange Pippin I emasculated all the buds to make sure, out of nine trials with different pollens, the pollen of Grenadier and High Cannons gave the best fruit. Cox's Orange is practically self-sterile, out of seven trials excluding bees no fruit set in any bag, and of those that were pollinated with their own pollen I have only one fruit.

In pears, out of twenty varieties tried only four set fruit where bees were excluded, and only four where pollinated with their own pollen, whilst in seven trials with pollen of a different variety the resulting fruit was good, in some cases the best on the tree. In pears it would seem that under favourable conditions any pollen of another variety will produce fruit, but in apples the pollen of some varieties seems to produce distinctly better results than the pollen of others. In plums also some varieties of plum seem to be better pollinizers than others, and certain pollen may suit certain varieties best.

The problems of the pollination and setting of fruit of our hardy fruits are worthy of the observation of fruit growers, experiment stations, and naturalists in different parts of the country; our American and Australian brothers have been studying these subjects, and are now able to advise which varieties to plant together with the prospect of getting fruit of good quality and in large quantity.

CECIL H. HOOPER, M.R.A.C.

EXPERIMENTS ON PERMANENT GRASS LAND, 1911.

FIELD NO. 13.

Experiments were continued on the 20 plots, each $\frac{1}{20}$ acre, used the last twenty years or more (see *Agricultural Students' Gazette*, April, 1889, August, 1889 and 1890, December, 1891, August, 1892, 1893, and 1894, July, 1895, August 1896 to 1903, December, 1904, and August, 1905 to 1910), the manures applied to each plot being the same in kind and in amount as in the previous years.

The manures and their amounts per acre are given below.

This is the twenty-fourth year in succession for the application of the same manures to plots 1—14, the twenty-third year of the farm-yard manure plots, and the twentieth year of the application of Thomas' basic slag and rape meal.

The farm-yard manure, 12 tons, was applied in January, 1910; the basic slag, 10 cwt., kainite, 5 cwt., in February; superphosphate, 5 cwt., the rape meal, 5 cwt., and guano, 5 cwt., on March 13th; the ammonium sulphate, 2 cwt., and the sodium nitrate, 2½ cwt., on April 20th, 1911.

The guano, Peruvian, contained combined nitrogen, 7·4 per cent., equivalent to ammonia 9·0 per cent., phosphates 27·8 per cent., and potash about 2·8 per cent.

The superphosphate contained 26·2 per cent. of "soluble" phosphate.

The kainite contained 12·1 per cent. of potash (K_2O).

The sodium nitrate, and the ammonium sulphate were of good commercial purity.

The basic slag contained phosphates equivalent to 38·3 per cent. of tricalcic phosphate.

The grass was cut on June 3rd, and the hay weighed on June 7th, in perfect condition.

The yield of plots, calculated to amounts per acre, was as follows:

		Per acre. cwt.	Excess over Unmanured plot. cwt.
A3.	Rape meal	26	6⅜
A2.	Thomas' basic slag	25½	5⅞
A1.	Farm-yard manure	38¼	18⅝
1.	Sodium nitrate	25⅜	5¾
2.	Kainite	24½	4⅞

		Per acre. cwt.	Excess over Unmanured plot. cwt.
3.	Guano	$23\frac{5}{8}$	4
4.	Superphosphate and ammonium sulphate	34	$14\frac{3}{8}$
5.	Kainite and superphosphate	$30\frac{1}{2}$	$10\frac{7}{8}$
6.	Kainite, superphosphate, and sodium nitrate	$40\frac{1}{2}$	$20\frac{7}{8}$
7.	Unmanured	$19\frac{5}{8}$	—
8.	Kainite, superphosphate, and ammonium sulphate	38	$18\frac{3}{4}$
9.	Ammonium sulphate	$28\frac{1}{2}$	$8\frac{7}{8}$
10.	Kainite and sodium nitrate	37	$17\frac{3}{8}$
11.	Kainite and ammonium sulphate ...	$39\frac{1}{2}$	$19\frac{7}{8}$
12.	Guano	$22\frac{1}{2}$	$2\frac{7}{8}$
13.	Superphosphate	$23\frac{1}{4}$	$3\frac{5}{8}$
14.	Superphosphate and sodium nitrate ...	$34\frac{7}{8}$	$15\frac{1}{4}$
B1.	Farm-yard manure	36	$16\frac{3}{8}$
B2.	Thomas' basic slag	$23\frac{7}{8}$	$4\frac{1}{4}$
A3.	Rape meal	$23\frac{5}{8}$	4

Some of the meteorological observations during the first half of the year are given below :—

	Rain. Inches.	Rainy days.	Average Rainfall, 40 years.	Mean temp. F°	Days of frost on grass.
January ...	1·16	12	2·50	36°7	20
February ...	1·81	14	2 09	38°9	12
March ..	1·84	20	2·00	39°8	13
April ...	1·01	9	1·91	45°7	7
May ...	·86	7	2·04	54°5	3
June to 7th	—	—	—	63°5	—
	6·68	64	10·54		

The unmanured plot gave a yield of nearly one ton of hay. All the plots gave a higher yield than the unmanured, and the general yield was higher than anticipated from the appearance of the crop before cutting. The highest yield, just over 2 tons of hay, was from the plot receiving superphosphate, kainite, and nitrate of soda, followed closely by kainite and ammonium sulphate; kainite, superphosphate and ammonium sulphate; kainite and nitrate of soda; superphosphate and nitrate of soda; and farm-yard manure, all giving $1\frac{3}{4}$ tons or more per acre. Phosphates and potash, on plot 5, showed an increase of about half-ton of hay over the unmanured, and in the hay the proportion of leguminous herbage was much larger than in some of the plots receiving nitrogenous manures in addition.

Peruvian guano, basic slag, and rape meal improved the quality of the herbage, but had little effect on the quantity, at this stage.

Kainite and nitrogenous manures without added phosphate continue to give large increases.

The average yield per acre of all the plots was 29¾ cwt. of hay, being about the average of the whole time of the experiments : the guano plots gave a yield below their average.

A partial botanical examination of the growth in the field and on some of the plots has been made by Mr. G. Stapledon, from whose report we have permission to take the following notes.

On the plot kainite and superphosphate the weight of grasses in proportion to leguminosæ was higher than last year : *Trifolium repens* much diminished in quantity, *Lathyrus* remaining the same.

With the complete mineral manure, including nitrate, plot 6, the ratio of grass to leguminosæ by weight was about 99 : 1, *Lathyrus* being practically the only representative of the latter order.

Bromus erectus was the predominant grass on all plots ; on plot 6, with complete manure containing nitrate, it had increased in amount over last year from about 70 to about 90 per cent. of the weight of the grasses and clovers at time of cutting, whilst cocksfoot had diminished from 13·9 to 2·8 per cent., leguminosæ largely diminished, and fescue very considerably.

On plot 5, cinereals only, the proportion of *Bromus erectus* was much the same as last year, but cocksfoot had diminished, whilst *Bromus mollis* had largely increased.

A comparison made on May 20th on two parts of the field, viz., the drier, shallower part nearer the A plots, and the deeper soil nearer the B plots, showed remarkable differences in weight of different species at that date.

Twenty-five samples from each area were taken by cutting the crop within a frame 6 in. × 6 in., with sheep shears, and sorting and weighing.

RELATIVE WEIGHT OF DIFFERENT CONSTITUENTS ON DIFFERENT AREAS OR AT DIFFERENT DATES :—

	Area of Deeper soil May 20.	Area of Shallower soil May 20.	Area of Shallower soil June 3.
Bromus erectus	14·6	44·8	45·3
B. mollis	27·4	6·7	1·8
Festuca duriuscula	8·7	13·8	14·8
Poa trivialis	7·4	4·4	2·8
Avena flavescens	2·5	1·0	1·8
Holcus lanatus	2·5	·8	·4
Lolium perenne	2·4	1·4	6·9
Dactylis glomerata	12·4	6·7	10·2
Anthoxanthum odoratum ...	·5	—	·9
Alopecurus pratensis	1·0	—	—
Cynosurus cristatus	—	—	·5
Festuca pratensis	—	·1	—
Avena pubescens	—	·3	·1
Total grasses	79·4	80·0	85·5

	Area of Deeper soil May 20.	Area of Shallower soil May 20.	Area of Shallower soil June 3.
Trifolium repens	7·3	7·7	5·7
T. pratense	—	1·0	·6
T. minus	·4	—	—
Lathyrus pratensis	—	1·4	·3
Total leguminosæ	7·7	10·1	6·6
Ranunculus bulbosus Traces of R. acris	9·5	8·8	7.9
Rumex acetosa	1·3	—	—
Other weeds	2·1	1·1	—
Total weeds	12·9	9·9	7·9
	100·0	100·0	100·00

The much smaller proportion of *Bromus erectus* and corresponding larger proportion of *B. mollis* on the deeper soil is very marked, also the larger amount of cocksfoot, *Holcus*, *Avena flavescens*, *Lolium*, *Poa trivialis*, and *Alopecurus pratensis* accompanied by a smaller amount of *Festuca duriuscula.*

In comparing the samples taken from the same area on May 20 and June 3 respectively, the great falling off in relative weight of *Bromus mollis* is remarkable, compensated by a like increase in weight of *Lolium perenne.*

This year the yield of the A plots (on the shallower soil) has been uniformly higher than the yield of the B plots (on the deeper soil, under similar manuring.

This departure from the average state of the yield in which the B plots give 2 to 3 cwt. of hay, per acre, more than the A plots, has occurred on all the 3 plots only once before, in 1896. In 1892 and 1896 this departure occurred on 2 out of the 3 duplicate plots. The Eastern (E) guano plot compared with the Western (W) plot behaves in a similar way, giving this year (also in 1892 and 1896) less yield on the deeper soil.

This result could hardly be anticipated; it is probably connected with the distribution of the plants, especially the grasses, and more especially *B. erectus*, on the different parts of the field. On the lighter soil *B. erectus* is more abundant than on the heavier and deeper soil, where its place is partly taken by *B. mollis*, cocksfoot, *Holcus lanatus*, and *Avena flavescens.* *B. erectus* has adapted itself to Cotswold conditions, in a dry season it will continue to increase when other grasses are at a standstill or even falling off, as does *B. mollis*; and probably it avails itself of such moisture as is in the brashy soil more readily than do most other grasses. No doubt there are other factors influencing this result, but the deficient rainfall in the spring, especially in the critical months of April and May, seem to be the principal factor, this acting somewhat differently on the different species of grass which are unevenly distributed throughout the field.

See the following table of yields in the years above mentioned, together with averages of the same plots for the whole time of the experiments.

	1892.	1896.	1906.	1911.	Average 19 years 19 [or 22 years].
		RAINFALL.			
April, inches ...	·94	·82	·73	1·01	[1·91]
May, inches ...	·93	·28	1·93	·86	[2·04]
		HAY PER ACRE IN CWTS.			
A3. Rape meal ...	$11\frac{1}{4}$	$21\frac{1}{2}$	15	26	$23\frac{3}{8}$
B3. ,, ,, ...	$10\frac{3}{4}$	$19\frac{7}{8}$	$14\frac{1}{2}$	$23\frac{5}{8}$	$25\frac{1}{2}$
A2. Basic slag ...	$11\frac{5}{8}$	$15\frac{1}{4}$	$16\frac{1}{8}$	$25\frac{1}{2}$	$23\frac{1}{4}$
B2. ,, ,, ...	$9\frac{7}{8}$	$12\frac{1}{4}$	$17\frac{1}{2}$	$23\frac{7}{8}$	$25\frac{1}{4}$
A1. Farm-yard ...	11	$24\frac{1}{4}$	$27\frac{1}{2}$	$38\frac{1}{4}$	$34\frac{1}{2}$
B1. Manure ...	$11\frac{5}{8}$	$22\frac{1}{8}$	$26\frac{1}{8}$	36	$37\frac{3}{4}$
W Guano ...	$14\frac{7}{8}$	$25\frac{3}{8}$	$17\frac{7}{8}$	$25\frac{5}{8}$	$28\frac{3}{4}$
E ,, ...	$13\frac{1}{4}$	20	$18\frac{7}{8}$	$22\frac{1}{2}$	$30\frac{7}{8}$
Hay cut ...	June 14	June 15	July 5	June 3	

In 1896, April, ·81 in. of the rain [·82] fell on 9 days in the middle of the month, and in May ·26 in. of the rain [·28] fell on 2 days, the 20th and 21st.

In 1911 from May 4th to June 14th only ·21 in. of rain fell.

In 1896 the average yield of all the experimental plots was 1 ton per acre; in 1911 it was very nearly $1\frac{1}{2}$ tons per acre.

1893 was a very dry spring, the grass crop was very short, and no hay was made.

Over the field generally upright brome had decreased since last year, presumably due to heavier grazing and subsequent manuring with farm-yard manure.

About 10 per cent. of the *B. erectus* was smutted by *Ustilago*, and cocksfoot was attacked by *Epichloe tryphina.*

When sampling the produce on May 20th, the complete produce of 25 readings of the 6 in. × 6 in. frame were taken from all over the field and made into hay, from which Mr. Stapledon calculated a crop of 25 cwt. of hay per acre; this came very near the actual result, and there was practically no increase from May 20th to harvest time.

E. K.

OFFICERS' TRAINING CORPS.

Sergt. Duncan, L.-Cpl. Pennington, and Cadet Hippisley were finally chosen to represent our O.T.C. at the Coronation in lining the streets. They obtained an excellent view of the procession, as they were stationed just outside Buckingham Palace.

Lieut. Mansel-Pleydell and 12 cadets were in the 2nd Batt. of Senior Infantry at the Royal Review in Windsor Park on July 3rd. In spite of the heat, however, we spent a very enjoyable day. The O.T.C.'s formed a huge hollow square two miles across, and we marched past the saluting base to the massed bands of the Guards. The sight will long remain in our memories as marking an epoch in voluntary training.

RESULT OF EXAMINATION FOR CERTIFICATES "A" AND "B."

CERTIFICATE "A."

Passed : Part I. and II.
- *Sergt. A. C. Duncan. } Obtained Certificate "A."
- *L.-Cpl. E. Staples. } Obtained Certificate "A."
- †Cpl. Stobart, Part II.
- †Cadet Lascelles, Part II.
- †Cadet Douglas, 1st Paper, Part I. and Part II.
- †Cadet Comely, C., 1st Paper, Part I., (a) (c) Part II.
- †Cadet Hippisley, 2nd Paper, Part I. and Part II.
- †Cadet Kershaw, 2nd Paper, Part I. and Part II.
- †Cpl. Swanwick, Part II.
- Cadet Ash, 2nd Paper, Part I., (b) (c) Part II.
- †L.-Cpl. Pennington, (a) (b) Part II.

* Have sat for written examination, Certificate "B" ; result not known.
† Result of written examination not known.

CAMP.

The Corps proceeds to camp 29th July, returning on 12th August. Camp at Windmill Hill, Salisbury. Captain Davy will take charge of contingent.

FARM NOTES.

At the Bath and West of England Society's Show at Cardiff Mr. Russell Swanwick obtained First and Second Prize for Cotswold ram lambs, also highly commended and commended for rams, and reserve for ewes.

At the Royal Agricultural Society's Show at Norwich Mr. R. Swanwick obtained a Second Prize for Cotswold Ram Lambs and a Third for Cotswold Ewe Lambs.

At the Newmarket Sales in June Mr. Russell Swanwick sold the following yearlings :—Crown Point, by Torpoint—Tiberia, for 400 guineas ; Guillo Romany, by Challacombe—Roman Matron, for 310 guineas ; and South Carolina, by St. Serf—Lady Baltimore, for 300 guineas. Mr. Bruce Swanwick sold Br. c., by St. Serf—Trevi, for 200 guineas.

A considerable number of manurial experiments are being carried out on seven different farms in Gloucestershire, in conjunction with the Sulphate of Ammonia Committee, on oats, swedes, and mangolds. The farms are at the Royal Agricultural College ; at Syde, at Arlington, at Aldsworth, at Nupend Farm, Nailsworth, at Coates, and at Swyre Farm, Coln St. Aldwyns. Results will be published when available.

Sugar Beet.—Five acres of sugar beet are growing on the Home Farm of Earl Bathurst in Oakley Park. The Board of Agriculture provided the seeds, these were sown on May 9th and 10th, and an excellent plant obtained notwithstanding the dry weather.

Excursion.—A most enjoyable and instructive excursion took place on May 23rd to Sherborne Park and to Messrs. Garne and Son's farm and Mr. T. Rich's farm at Aldsworth, and Captain R. B. Brassey's farm. Space does not admit of a detailed account, but the thanks of the R.A.C. are due to the above-named hosts for their hospitality and for instruction imparted.

COLLEGE NOTES.

The Regulations and Schemes of Study for Degrees in Agriculture and Forestry in the University of Bristol are in active preparation. Undergraduates of the University will be able to commence the course of study for one or other of these degrees in the autumn of this year. The course is three years in length, of which the first will be spent in Bristol, where intermediate science, chemistry, physics, and biology will be pursued. The second and third years of the degree course will be spent at Cirencester.

The Ordinances associating the College with the University were published in the *Gazette* of last December, pp. 57, 58.

Pursuant to these Ordinances the University has appointed the Right Hon. Henry Hobhouse, P.C., and Charles N. P. Phipps, Esq., D.L., J.P., Governors of the College, and the College has appointed Lord Moreton, Colonel Chester-Master, and Professor Penberthy, F.R.C.V.S., members of the Court of the University.

CHLORINE IN RAIN WATER.

The rainfall for the six months ending March 31st, 1911, was 16·97 inches, falling on 105 days, it contained as a mean chlorides equivalent to ·48 grains of sodium chloride per gallon, and this equals a deposit of 26·08 lbs. of common salt per acre.

For the twelve months ending at the same date the fall was 31·13 inches on 195 days, and the chlorides equivalent to 40·64 lbs. of common salt per acre.

E. K.

OLD STUDENTS AND STAFF.

Sir Wm. T. Thiselton-Dyer, K.C.M.G., C.I.E., etc., formerly Professor of Natural History, R.A.C., was given the Degree of D.Sc. at the Commemoration at Oxford in June last.

Prof. Andrew Rutherford, late of the R.A.C., is now at Cornell University, Ithaca, N.Y., working in the Entomological Department chiefly, we believe, on Sawflies and Coccids.

OLD STUDENTS AND CORONATION HONOURS.

The Earl of Crewe, K.G. (R.A.C. 1888), Secretary of State for India, has been raised to the dignity of a Marquess of the United Kingdom.

John Bowen Bowen-Jones, M.R.A.C. (1860), J.P., Chairman of Shropshire County Council, a Royal Commissioner for Improvement of Breeding of Horses, was made a Baronet.

OBITUARY.

Lionel Charles George Sartoris (R.A.C. 1882-1883) died at Charing Cross Hospital on April 6th, 1911, aged 48.

SURVEYORS' INSTITUTION EXAMINATIONS.

At the recent examinations of the Surveyors' Institution Mr. Randle William Carr, M.R.A.C., and Mr. Lionel Forrester Stobart M.R.A.C., passed the Final Examination for Professional Associateship. The following students passed the Intermediate Examination : Messrs. R. G. Anderson, J. P. C. Done, W. G. M. Gay, G. M. Gibbs, and R. A. Shann.

DIPLOMA EXAMINATION.

At the end of the Lent term, 1911, Mr. Edward Ash and Mr. Christopher Comely received the Diploma of Membership of the R.A.C.

The external examiners were Prof. E. Blundell in Agriculture, Dr. J. A. Voelcker in Agricultural Chemistry, Prof. H. Robinson, M.I.C.E., in Surveying and Engineering, Prof. W. Hunting, F.R.C.V.S., in Veterinary Science, and Prof. G. S. West, D.Sc., in Agricultural Botany.

SCHOLARSHIPS.

Last term the first Scholarship was awarded to Richard Basil Comely, whilst the second and third were divided by Harold Edwin Hippisley and Richard Watson Pennington.

Thomas Douglas received Honourable Mention for the Term's work.

LAWN TENNIS.

R.A.C. v. DR. MARSHALL'S TEAM.—Played at the College on the 3rd June. Dr. Marshall's team : Dr. Marshall, Buchanan, Sewell, Lawrence, Painton, and Fowler. R.A.C. : Gagliardi, Pickering, Lewis, Sabit, Olivares, G. de Trafford. The College lost by 8 matches to 1.

R.A.C. v. CIRENCESTER TOWN.—Played in Earl Bathurst's Park on the 7th June. Town team : Townsend, Lawson, Perry, Mills, Donaldson, and Cole. R.A.C. : Gagliardi, Pickering, Lewis, Sabit, Olivares, and G. de Trafford. The College won by 5 matches to 4.

R.A.C. v. EAST GLOUCESTERSHIRE CLUB.—Played on the 10th June at the College. R.A.C. team : Gagliardi, Pickering, Olivares, de Trafford, Lewis, and Barnes. East Gloucestershire Club : Cox, J. R. Weechs, W. W. Christie, Seaton, Morton, and Levaser. The College won by 5 matches to 4.

R.A.C. v. Fairford.—Played at the College on the 14th June, the R.A.C. winning by 6 matches to 3. Fairford: Gantlett, Hiscock, Townsend, Perry, Luker, and Cook. College: Pickering, Gagliardi, Lewis, Barnes, Olivares, and de Trafford.

R.A.C. v. Dr. Marshall's Team.—This match was played on the 15th June at the College, the home team winning by 6 matches to 3. College: Gagliardi, Pickering, Lewis, Barnes, de Trafford, and Olivares. Dr. Marshall's team: Dr. Marshall, Swanwick, Sewell, Robinson, Dennis, and Craig.

R.A.C. v. Rev. A. W. R. Cheales' Team.—Played at the College on the 17th June, the R.A.C. losing by 8 matches to 1. College: Gagliardi, Pickering, Lewis, Barnes, de Trafford, and Olivares. Rev. A. W. R. Cheales' team: Rev. A. W. R. Cheales, Schultzo, Willis, Severn, Dyer, and Seaton.

R.A.C. v. Fairford.—This match was played at Fairford on the 21st June, the College winning by 9 matches to nil. College: Gagliardi, Swanwick, Lewis, Barnes, de Trafford, and Olivares. Fairford: Gantlett, Hiscock, Arkell, Cole, Luker, and Cooke.

R.A.C. v. Cirencester Town.—This match was played on the 28th June, on the College courts, the home team winning by 6 matches to 3. Town team: Lawson, Townsend, Perry, Cole, Mills, and Mullings.

R.A.C. v. Swindon.—Played on July 1st, on the R.A.C. courts, the College losing by 5 matches to 4. Swindon team: Wood, Bridge, Watson, Pineger, Rich, and Sabit. College: Gagliardi, Pickering, Lewis, Barnes, Olivares, and de Trafford. In this match Swindon were short of two of their players, and College men had to take their places.

Past v. Present.—Played on the 5th July, on Mr. Swanwick's court and the College courts, the College winning by 6 matches to 3. Past: Haskett Smith, Cheales, Jeudwine, Ellett, Swanwick, and Northen. Present: Gagliardi, Pickering, Olivares, de Trafford, Lewis, and Barnes. The last match of the season, every game being well contested.

R.A.C. v. Rev. A. W. R. Cheales's Team.—Played on the 8th July on the Home Courts and resulted in a draw. College: Gagliardi, Pickering, Lewis, Barnes, de Trafford, Olivares. Rev. Cheales's team; Rev. Cheales, Dyer, Willis, Severn, Weech, and Seaton.

The College team comprised the following this year: Gagliardi (captain), Pickering, Olivares, de Trafford, Lewis, and Barnes. Sabit played twice for the College, for which thanks are due. The play has considerably improved. having won seven, drawn one, and lost three matches out of a total of eleven. The team have played well together, but were inclined to be downhearted on occasions when the sets were going against them. It was brought to the notice of the Captain by a Captain of one of the opposing teams that the younger members of the College team were in the habit of using improper language whilst playing. This was not edifying, and it is hoped that there will be a change for the better in future years. Best thanks of the team are due to Mr. and Mrs. Gantlett, of Fairford, for their kind hospitality.

The Lawn Tennis Challenge Cup for Singles was won by L. F. Stobart, beating F. C. Pickering in the final.

CRICKET.

The cricket team opened the season rather badly by losing the first seven matches. The matches against Cheltenham and Bristol University were well contested, the College losing in each case by a few runs. The improvement towards the middle of the season was due to the excellent batting of the Captain, Mr. Hippisley, and the example he set to the rest of the team. Mr. Hippisley has made two centuries, one against the Lancashire Fusiliers and the other against East Gloucestershire, and has played several good innings in other matches. Stobart has not quite reached his last year's form, although on several occasions he has made big scores. An outstanding feature of the season's play has been the batting of Sudbury, who has played some remarkably good innings, his best effort being against Stroud on the College ground. The College bowling has also been strengthened by the discovery of Lascelles towards the middle of the season, his performance against Wye College being exceedingly good. Nearly all the wickets have fallen to Kershaw, Sudbury, Lascelles, and Gay, the bowling being quite good throughout the season. We have been able to arrange matches for the first time with Bristol University and Wye Agricultural College, and resumed our match with Cheltenham College, and it is to be hoped that these matches will now be played annually. Vaughan has prepared exceedingly good wickets for all our home matches, in addition to providing excellent nets throughout the term.

CHARACTERS OF THE TEAM.

H. E. HIPPISLEY (Captain).—Has shown excellent form with the bat, his splendid innings of 60 against Bristol University being his best performance, although on two occasions he has reached the century. His fielding has been superb and a pleasure to watch. He has proved himself an efficient captain in the field, and has shown remarkable keenness in helping and encouraging his team at the nets.

M. KERSHAW.—Has bowled exceedingly well all through the season as well as making runs at critical periods of several matches, which he has largely helped to pull out of the fire, *e.g.*, against Cheltenham College and Wye College. He is also an excellent field.

L. F. STOBART.—Has not batted so well as last season. He has lost his wicket on several occasions by attempting to cut good length balls, with the result that he has either been caught in the slips or has broken his wicket. An excellent field, and has two wickets to his credit, both clean bowled.

A. H. V. SUDBURY.—Has not bowled quite so well as last season, but has captured a good many wickets. His run getting capacity towards the close of the season was also very creditable. A good field.

W. G. M. GAY.—Has not played so often as he might have done. A very useful player with both bat and ball. His fast bowling would have been exceedingly helpful on some of the hard wickets if he had been available.

H. LASCELLES.—A good left-hand bowler, bowling exceedingly well on several occasions, as well as knocking up runs quickly in his own special style.

A. W. FERRAND.—A pretty bat, but has not scored many runs ; a good field, and a good change bowler.

O. H. LEE LUM.—Has kept wicket towards the end of the season with some success. A quick field and a safe one. Has been unlucky in not getting more runs. The wicket has been too dry to suit his bowling.

C. M. HOARE.—Has made some very useful scores, but is rather apt to get his legs in front of the wicket. A good field, and also a change bowler.

N. E. F. CORBETT.—Unfortunately has only been available for a few matches. An excellent bat with a pretty forward stroke. Useful field. Kept wicket quite well on two occasions.

CAPT. DAVY.—A good field and very keen, but has not been lucky in getting runs.

Our thanks are also due to A. B. Rikh, C. L. White, H. A. Pritchard, P. C. Done, R. W. Wilson, C. Warwick, J. W. White, and T. C. Lewis, who have each played on more than one occasion.

R.A.C. v. SWINDON.—This, the opening match of the season, was played on May 20th on the Swindon County Ground. The weather was fine, but chilly, and the ground was fast. The College opened with Stobart and Ferrand, but wickets fell fast, Captain Davy being the only man in the team who seemed to know anything about the bowling. The College were dismissed for the small total of 40. After lunch, Swindon made a fairly good start, and nearly reached the total with 10 wickets in hand, but they had two down for 34, and three for 41, being eventually dismissed for 114. Score :—

R.A.C.

L. F. Stobart, c Overton, b Dibsdale	2	c Overton, b Dibsdale	15
A. W. Ferrand, b Dibsdale	2	b Overton	7
M. Kershaw, st Shail, b Dibsdale	1	c Shail, b Dibsdale	5
H. E. Hippisley, run out	1	b Overton	23
Captain Davy, run out	14	b Dibsdale	0
C. W. White, b Overton	0	not out	1
A. Rikh, c Dibsdale, b Overton	4	c and b Overton	0

P. C. Done, b Dibsdale	0	c Morrison, b Overton	6
O. H. Lee-Lum, not out	7	st Shail, b Dibsdale	0
A. H. V. Sudbury, c and b Overton	0	b Overton	3
T. C. Lewis, b Dibsdale	1	b Overton	0
Byes 7, l-b 1	8	Leg-byes	1
Total	40	Total	61

SWINDON.	
D. C. H. Morrison, b Sudbury	20
A. G. Dibsdale, run out	13
S. Whittaker, b Kershaw	1
G. W. Mathews, b Kershaw	8
H. G. Mathews, c Rikh, b Sudbury	1
E. G. Whittaker, b Kershaw	2
J. Pugh, c Davy, b Ferrand	30
A. Binnie, b Ferrand	13
C. Williams, not out	7
P. Overton, b Sudbury	2
W. Shail, b Sudbury	6
Byes 10, l-b 1	11
Total	114

R.A.C. v. CHELTENHAM.—This match was played on the College ground on May 24th, and resulted in a win for the visitors by two wickets. Cheltenham won the toss, and put the College in to bat. Wickets went down one after the other, seven wickets being down for 34. Then Corbett and Hoare got together and made a brilliant stand, putting on 65 runs for the eighth wicket, Corbett making some lovely strokes. The total score was raised to 124, which was not so bad considering the bad start. Cheltenham then started their innings in great style, making 78 for the first wicket, but after that Sudbury and Gay bowled well, and they had eight wickets down for 112, making a most exciting finish. The eighth wicket put on the necessary runs, and they were soon after all dismissed for 132, Sudbury being in great form with the ball, getting five wickets for 40. Corbett and Hoare were the only College men who seemed to make any show; both of them played extremely well, and saved the College from a very bad defeat. Score:—

R.A.C.		CHELTENHAM.	
L. F. Stobart, c Mont'non, b Yiend	9	C. S. Barnett, run out	38
A. W. Ferrand, b Barnett	2	A. Montagnon, c Lee-Lum, b Gay	28
W. G. M. Gay, l-b-w, b Barnett	7	S. Wood, c Rikh, b Sudbury	8
H. E. Hippisley, c and b Barnett	0	S. Rust, c Hoare, b Gay	12
Capt. Davy, c and b Barnett	0	H. T. Holden, b Sudbury	6
M. Kershaw, b Barnett	0	W. Wood, b Sudbury	0
N. F. Corbett, b Wood	56	V. Barnett, b Gay	5
O. H. Lee-Lum, b Yiend	1	S. G. Holman, b Gay	2
C. M. Hoare, b Wood	39	L. Dimmer, not out	10
A. Rikh, b Wood	0	E. F. Chaney, b Sudbury	8
A. H. V. Sudbury, not out	3	Yiend, c Stobart, b Sudbury	0
Byes	6	Byes, &c.	15
Total	123	Total	132

R.A.C. v. STROUD.—The College journeyed over to Stroud on the 27th of May to try their luck there. They were without the services of Sudbury and Gay, and so the bowling was a bit weak. Hippisley won the toss, and opened the College innings with Stobart. They made quite a fair start, putting on 38 for the first wicket, when Hippisley was given out to a doubtful l-b-w. Hoare and Ferrand did not remain long, but Kershaw made his 37 in fine style, hitting out grandly. At lunch time tne score stood at 102 for 4, Stobart not out 35, Davy not out 0. After lunch, Captain Davy was soon out, and was followed closely by Stobart, having made a patient 40, caught as usual in the slips. Lee-Lum and White made a good stand for the eighth wicket, which helped on the score, making the total 168. The day was very close and hot, and very tiring for the bowlers, or else the College might have won, as Kershaw could not keep it up all through the innings, and there seemed to be no one else who had any effect on the Stroud batsmen, who passed the College total with three wickets in hand. Kershaw bowled extremely well the time, getting five wickets for 57. Score :

R.A.C.		STROUD.	
L. F. Stobart, c Poole, b M'Donald	40	R. T. Godsell, b Ferrand	9
H. E. Hippisley, l-b-w, b Beauvais	22	F. C. de Beauvais, b Kershaw	52
C. M. Hoare, b Curnow	4	R. N. Curnow, run out	29
A. W. Ferrand, c H'way, b B'vais	1	G. W. Holloway, b Kershaw	8
M. Kershaw, b MacDonald	37	S. M. Gregory, c Wilson, b K'shaw	6
Captain Davy, b Poole	6	D. MacDonald, c Rikh, b Kershaw	17
R. W. Wilson, st Fry, b M'Donald	5	V. Lawson, b Kershaw	24
O. H. Lee-Lum, c H'way, b C'now	22	H. Poole, not out	43
C. L. White, c Fry, b Curnow	14	C. E. Fry, b Lee-Lum	16
C. Warwick, c Holloway, b Curnow	8	H. A. Flacke, b Stobart	12
A. Rikh, not out	2	R. Jones, not out	12
Leg-byes 5, w 2	7	Byes 10, l b 2, w 1, n b 1	14
Total	168	Total	242

R.A.C. v. GLOUCESTER.—The College visited Gloucester this year on May 31st, and were opposed by a strong side. The College won the toss, and batted first, opening their innings with Hippisley and Stobart. The latter was soon clean bowled, when the score was 19. Kershaw then joined Hippisley, and the score had reached 35 before he was dismissed. Wickets then fell fast, and no one was found able to stay with Hippisley, who was playing very well, making some lovely strokes. He eventually carried his bat for a well earned 38, and doubtless would have made many more if he could have found a partner to stay with him. Gloucester then went in, and very soon lost Godsell and Freeman, both being dismissed off Kershaw's bowling ; but on Rust joining Freeman runs came fast, and they just failed to reach the College total before Freeman was dismissed, but the next wicket soon added the required runs. Full score :—

R.A.C.		GLOUCESTER.	
L. F. Stobart, b Paish	7	R. T. Godsell, b Kershaw	1
H. E. Hippisley, not out	38	W. Freeman, c Done, b Kershaw	31
M. Kershaw, c Paish, b Ford	10	T. A. Truman, c Davy, b K'shaw	1
C. L. White, b Ford	1	T. Rust, c Rikh, b Sudbury	48
C. M. Hoare, b Ford	0	Paish, b Stobart	10
Captain Davy, b Ford	0	B. V. Bruton, not out	29
O. H. Lee-Lum, b Ford	2	E. Hervey, b Sudbury	4
L. C. Warwick, l-b-w, b Paish	0	A. E. Kent, not out	30
A. Rikh, b Ford	3	P. H. Ford, A. C. Whiting, and G. H. Seabrook did not bat.	
A. H. V. Sudbury, st Seabrook, b Paish	6		
P. C. Done, b Ford	1		
Leg-byes 2, w 4, n-b 1	7	Byes 9, l-b 8, w 3	20
Total	75	Total	174

R.A.C. v. MONKTON COMBE SCHOOL.—This match was played at Monkton Combe School on June 3rd. The College were well represented but for the absence of Sudbury. The home team won the toss and batted first on a hard wicket. Smith and Shannon opened the batting against Ferrand and Hoare. Unfortunately Kershaw, Lascelles, and Stobart were late owing to a breakdown on their car. Smith played a good innings but Shannon left him when the score stood at 29. Smith was caught at the wicket off Hoare soon afterwards. Kershaw took the ball and wickets fell at regular intervals until Chester-Master made a stand for the eighth wicket. However, after his wicket fell the remaining two did not stand long, and the innings closed for a total of 129. Stobart and Wilson opened for the College against Smith and Warren, and they scored 30 in a very short time. Wilson was then run out with the total at 31. Lascelles, the next batsman, was soon l.b.w. to Warren, but Stobart who had made a well-played 30 had to unavoidably leave the field with Lascelles. Hippisley was bowled off his pads in the next over and then wickets fell fast till Ferrand and Lee Lum made a stand. However, the innings closed for the modest total of 104, the College being defeated by 19 runs. The home team played a second innings, making over 90 for 6 wickets, three of their men being run out. Stumps were then drawn as the light was failing. Score :—

MONKTON COMBE.	
K. Smith, c Rikh, b Hoare	19
R. W. Shannon, l-b-w, b Hoare	9
J. de Wilton, c White, b Hoare	10
H. E. B. Dickson, b Hoare	0
A. F. W. Dixon, l-b-w, b Kershaw	7
H. Light, l-b-w, b Kershaw	1
W. C. S. Johns, b Kershaw	8
G. E. Chester-Master, c Warwick, b Lascelles	32
E. R. Green, c Hoare, b Kershaw	14
T. S. Warren, b Kershaw	0
V. H. Benton, not out	6
Extras	23
Total	129

R.A.C.	
L. F. Stobart, retired	30
R. Wilson, run out	10
H. Lascelles, l-b-w, b Warren	1
H. Hippisley, b Smith	3
C. M. Hoare, st Benton, b Warren	6
M. Kershaw, b Smith	5
A. W. Ferrand, st Dickson, b Green	13
C. White, b Smith	7
O. H. Lee-Lum, c and b Johns	19
E. Warwick, b Green	0
A. Rikh, not out	4
Extras	6
Total	104

R.A.C. v. BRISTOL UNIVERSITY.—The College played their first match with Bristol University on the College ground on Wednesday, June 7th, the match resulting in a win for the University by 18 runs. Bristol won the toss and Slade and Clarke opened the innings against the bowling of Sudbury and Kershaw. The wicket was very fast, runs coming quickly. With the score at 40 Ferrand went on in place of Sudbury, and Clarke was well taken behind the wicket with the score at 51. Lascelles went on at the other end and bowled very well, beating Melhuish and obtaining Reynolds' wicket next over. Runs came slowly for a time till Elliot hit rather merrily until he was given out l.b.w. to Lascelles. Slade, who had been batting exceedingly well was bowled by Sudbury when he had made 51. He had batted well for an hour, getting his runs in good style all round the wicket. Runs came very quickly until the score stood at 156 for 7 wickets. Kershaw went on to bowl in place of Sudbury and dismissed the last three batsmen in successive balls, thus performing the "hat trick." Stobart and Hippisley opened the College innings and took the score to 40 when the teams adjourned for tea. With the score at 45, Stobart hit his wicket in bringing off a late cut. Ferrand stayed with Hippisley until the score was 70, when he was bowled by a "yorker" from Harrison. Hippisley continued to bat well, scoring freely all round the wicket, but wickets fell rapidly until Lee Lum made a stand with Hippisley, the latter losing his wicket by attempting to hit out to a good length ball on the leg stick. Lee Lum batted well for 20 and made a great effort to win the match, but the College innings closed for 138, thus losing the match by 18 runs. The game was well contested throughout, the College tail failing to make any effort against the bowling of Harrison and Elliot. Hippisley and Slade gave very good exhibitions of batting for their respective sides.

BRISTOL UNIVERSITY.	
R. A. Slade, b Sudbury	51
C. H. Clarke, c Rikh, b Ferrand	23
J. B. Melhuish, b Lascelles	2
S. H. Reynolds, c and b Lascelles	3
R. G. F. Beate, b Lascelles	4
C. C. Harrison, c Rikh, b Lascelles	2
W. H. A. Elliot, l-b-w, b Lascelles	28
F. W. Rixon, not out	21
F. V. Jacques, c and b Kershaw	1
R. P. W. Woolsey, b Kershaw	0
H. J. W. Smythe, b Kershaw	0
Byes 19, w 1, n-b 1	21
Total	156

R.A.C.	
L. F. Stobart, ht wkt, b Melhuish	19
H. E. Hippisley, b Melhuish	60
A. W. P. Ferrand, b Harrison	21
C. M. Hoare, b Harrison	21
M. Kershaw, b Harrison	0
R. W. Wilson, b Elliott	4
H. A. Pritchard, b Elliot	0
O. H. Lee-Lum, c Clarke, b Melhuish	20
A. H. V. Sudbury, b Elliot	0
A. B. Rikh, not out	4
H. Lascelles, c Rixon, b Melhuish	0
Byes 4, l-b 1, w 1	6
Total	138

R.A.C. v. CIRENCESTER TOWN.—This season this annual match was played on June 10th on the Town ground and resulted in an easy win for the Town. The Town batted first, opening with Tovey and Lawson to the bowling of Kershaw and Sudbury. The latter soon dismissed Lawson, but on Bambridge joining Tovey a stand was made. The second wicket fell when 94 runs had been registered. Mansel-Pleydell played well for his 32, but none of the others gave much trouble, the whole side being dismissed for the useful score of 208. Kershaw bowled exceedingly well all through the innings, getting 6 wickets for 62 runs. The College opened their innings with Hippisley and Stobart, but neither gave much trouble. All the rest of the wickets fell quickly, except Kershaw; he hit out well for his 20, the last wicket putting on 14. The whole side was out for the small total of 70, the Town thus winning by 138 runs. Full score:—

CIRENCESTER.		R.A.C.	
W. Tovey, b Kershaw	58	L. F. Stobart, c Tovey, b Allen	11
J. Lawson, b Sudbury	0	H. E. Hippisley, c and b Tovey	13
W. H. Bambridge, c Kershaw, b Sudbury	42	C. M. Hoare, b Tovey	4
S. Boulton, run out	15	O. H. Lee-Lum, b Tovey	0
C. Allen, l-b-w, b Kershaw	9	C. L. White, b Tovey	0
E. M. Mansel-Pleydell, b Kershaw	32	Capt. Davy, c and b Lawson	4
H. Bilsborrow, b Kershaw	3	M. Kershaw, b Tovey	20
F. W. Bridges, b Lascelles	11	H. Pritchard, b Tovey	0
R. J. Mullings, b Kershaw	4	A. B. Rikh, b Tovey	1
C. Jones, c and b Kershaw	7	A. H. V. Sudbury, b Lawson	8
R. Heath, not out	1	H. Lascelles, not out	2
Byes 15, l-b 6, w 4, n-b 1	26	Leg-byes 6, n-b 1	7
Total	208	Total	70

In the second innings of the Royal Agricultural College L. F. Stobart scored (not out) 37; H. E. Hippisley (b Bridges) 19; C. M. Hoare (not out) 2; M. Kershaw (b Jones) 22; byes 17, l-b 4—total 101.

R.A.C. v. SWINDON WEDNESDAY.—Played on the College ground and resulted in an exciting win for the home side just on time. The College won the toss and batted first, opening with Hippisley and Stobart. They put on 164 for the first wicket, when Stobart was bowled. On Gay joining Hippisley runs again came freely and Hippisley reached his century, but soon afterwards he was bowled with the total at 187. Ferrand played well, and when the score stood at 240 the innings was declared closed, Gay and Kershaw being the not outs, Ferrand having been bowled shortly before. Swindon were left with one and a half hours to bat. Wickets began to fall fast, two being down for four runs, then Pound and Bown brought the score to 61, when the latter was bowled by Kershaw. The next ball dismissed Pakeman—61 for four wickets. They had 108 runs for six wickets and only 12 minutes more to play, when Kershaw bowled Gray and next ball clean bowled Coffer and it was "over." Gay with the first delivery of his over bowled Mercer and the same over got the last man caught, only one run being added, and the College won three minutes before time. Full score:—

R.A.C.		SWINDON.	
L. F. Stobart, b A. Bown	52	F. Humphreys, b Gay	0
H. E. Hippisley, b A. Bown	109	F. Yoiell, run out	3
W. G. M. Gay, not out	47	C. Pound, run out	47
A. W. Ferrand, b C. Pound	29	A. Bown, b Kershaw	13
M. Kershaw, not out	1	R. Pakeman, b Kershaw	0
C. M. Hoare, R. W. Wilson, O. H. Lee-Lum, P. C. Done, A. B. Rikh, and H. Lascelles, did not bat.		Funge, b Ferrand	5
		B. Gray, b Kershaw	7
		Mercer, b Gay	0
		J. Coffer, b Kershaw	0
		James, not out	0
		W. J. Ford, c Rikh, b Gay	0
Extras	34	Extras	34
Total	272	Total	109

R.A.C. v. LANCASHIRE FUSILIERS.—This match was played on the College ground on June 17th, and resulted in a win for the College by an innings and eight runs. There had been rain overnight which made the wicket a bit soft, and there were clouds about which made the light none too good to start with. Hippisley won the toss and opened the College innings with Stobart, but when the score was 10 the latter was bowled through his legs. Gay took his place and they each played well until Hippisley was bowled for 21. Ferrand and Kershaw were soon dismissed, but the rest of the team played up well. Hoare played well and Lee Lum was settling down when he was unluckily run out.

Sudbury and Lascelles made a great stand, putting on 33 for the last wicket, Lascelles giving a fine display of hard hitting—two sixes and a four in three successive balls. Sudbury also got some nice hits, getting a six and two fours. The Lancashire Fusiliers went to the wickets after lunch, but failed before the bowling of Kershaw and Sudbury, seven wickets being down for 31. They eveneventually made 56, and had to follow on, but this time Lascelles trundled the ball with great success in the first part of the innings, nearly getting the hat trick. Sudbury and Kershaw eventually finished them off for 105 all out. Full score :—

R.A.C.

L. F. Stobart, b Humphreys	11
H. E. Hippisley, b Elliot	21
W. G. M. Gay, c Humphreys, b Cleghorne	23
A. W. Ferrand, run out	1
M. Kershaw, l-b-w, b Elliot	0
C. M. Hoare, l-b-w, b Chapman	21
R. W. Wilson, c Elliot, b Chapman	11
O. H. Lee-Lum, run out	14
A. B. Rikh, b Elliot	14
A. H. V. Sudbury, c Hardy, b Elliot	17
H. Lascelles, not out	20
Byes 15, l-b 1, w 3	19
Total	168

LANCASHIRE FUSILIERS.

Sergt. Perry, b Kershaw	0	b Lascelles	16
Bandsman Hardy, c Kershaw, b Sudbury	0	b Lascelles	6
Bandsman Elliot, b Sudbury	13	b Lascelles	0
Lieut. Humphrey, c Rikh, b Kershaw	3	b Lascelles	0
Lieut. Cross, b Kershaw	5	b Lascelles	16
Bandsman Cleghorne, b Sudbury	1	b Sudbury	12
Lieut. Sechan, c Hoare, b Sudbury	7	c Hippisley, b Sudbury	24
Bandsman Hucker, b Sudbury	0	b Ferrand	11
Bandsman Hill, b Kershaw	0	b Kershaw	4
Lance-Corp. Chapman, b Kershaw	2	b Kershaw	5
Bandsman Brown, not out	0	not out	0
Byes 23, l-b 2	25	Byes 10, l-b 1	11
Total	56	Total	105

R.A.C. v. GLOUCESTER.—The return match was played on the College ground on Wednesday, June 21st. Gloucester batted first, and runs came very slowly against the bowling of Lascelles and Kershaw. Lascelles obtained the first wicket, Paish being smartly caught at the wicket by Lum when only 12 runs had been scored. At the same time Freeman was bowled by Kershaw. Truman hit up runs quickly, scoring two sixes, but was taken in the slips with the score at 34. Lawrence and Harvey made a stand, but Gay, going on in place of Kershaw, secured both wickets. At the luncheon interval the score stood at 146 for nine wickets. The innings closed immediately after lunch for a score of 152. Stobart and Kershaw opened the College innings, the latter being dismissed with the score at 16. Gay and Lum failed to stay against the bowling of Ford and Paish ; but Sudbury hit out, his score of 26 including two sixes and three fours. Stobart batted well for 23, while Hoare and Davy stayed together for some time, the former batting exceedingly well for 31. Lascelles batted well for 11, but the remaining batsmen failed to stay with him, the College innings closing for 132, thus losing the match by 20 runs. Score :—

GLOUCESTER.

W. Freeman, b Kershaw	2
Paish, c Lee-Lum, b Lascelles	1
T. A. Truman, c Kershaw, b Sudbury	31
T. Rust, c Hoare, b Sudbury	11
T. Lawrence, c Lascelles, b Gay	22
B. V. Bruton, b Kershaw	3
E. Harvey, b Gay	46
F. W. Dee, b Sudbury	0

R.A.C.

L. F. Stobart, b Ford	23
M. Kershaw, l-b-w, b Ford	4
W. G. M. Gay, b Ford	4
O. H. Lee-Lum, l-b-w, b Paish	3
A. H. V. Sudbury, c Lawrence, b Paish	26
C. M. Hoare, c Rust, b Paish	31
C. L. White, b Freeman	5
Capt. Davy, b Paish	8

J. H. Seabrook, b Gay	0
A. S. Whiting, b Kershaw	1
P. H. Ford, not out	11
Byes 17, l-b 3, w 4	24
Total	152

H. Lascelles, not out	11
P. C. Done, b Paish	1
H. Pritchard, b Freeman	1
Byes 9, l-b 1, n b 6	16
Total	133

In the second innings of Gloucester T. A. Truman scored (b Kershaw) 99 ; T. Rust (c Pritchard, b Hoare) 2 ; B. V. Bruton (not out) 51 ; E. Harvey (b Kershaw) 1 ; F. W. Dee (l-b-w, b Kershaw) 1 ; A. S. Whiting (b Kershaw) 2 ; byes 11, l-b 6—total 173.

In the second innings of the Royal Agricultural College J. W. White scored (b Whiting) 17 ; A. H. V. Sudbury (not out) 3 ; P. C. Done (c Ford, b Dee) 1 ; H. Pritchard (not out) 17—total 38.

R.A.C. v. CHELTENHAM COLLEGE.—This is the first match between the two Colleges which has taken place for a great many years. It was played at Cheltenham on the College ground, on Saturday, June 24th, and resulted in a win for the R.A.C. by three wickets, though only eight more runs were added for the last three wickets. Cheltenham won the toss, and batted first. Runs came slowly but steadily until Sudbury clean bowled Barnes with the last ball of an over, and the next ball from Kershaw clean bowled Wood, the score being two wickets for 22 runs. Shortly after this, the sides adjourned for lunch. After lunch Kershaw clean bowled Shewen and Brown, and then the match was stopped for rain, which made the ball very hard to hold, four wickets being down for 30. The R.A.C. prospects were very good, and they looked like dismissing their opponents for a very small total, but Wise and Shelmerdine carried the score to 68, when the latter was caught cover point by Hippisley off Lascelles. Shortly afterwards the match was again stopped owing to rain for ten minutes. On resuming Kershaw bowled Wise, and after another stop, owing to rain, the whole side was dismissed for 108 runs. The R.A.C. opened with Hippisley and Stobart, and runs came fairly fast, considering it was a slow scoring ground. They put on 46 for the first wicket, Stobart being the first to go, having made 27, being bowled off his pads. Hoare came in, but was soon dismissed. Next came Wilson, who made another stand, bringing the score up to 76 for the third wicket. Lee-Lum came next, and brought the score, with Hippisley, up to 88. Then Hippisley was l-b-w for a carefully made 27, and Lee-Lum was bowled having made 7. C. L. White was dismissed for 0. J. W. White was out first ball. Then Done joined Kershaw, and the Cheltenham total was passed with three wickets in hand. Done was soon afterwards caught, and Kershaw was caught in the out field, and Sudbury was also caught in the same way, Lascelles, never getting a ball, was unable to add to the total score, which was 116. The fielding on both sides was very good, but the feature of the day was the bowling of Kershaw, who took seven Cheltenham wickets for 23 runs, and made 24 runs himself, thus winning the match by his all round performance. This match will, it is hoped, be played now every year for a great many years, and prove as great a success as it did this time. Full score :—

CHELTENHAM COLLEGE.	
J. E. C. Wood, b Kershaw	13
J. Barnes, b Sudbury	8
A. V. D. Wise, b Kershaw	42
W. G. M. Shewen, b Kershaw	4
H. F. Brown, b Kershaw	0
J. A. Shelmerdine, c Hippisley, b Lascelles	10
A. M. Durand, b Kershaw	3
T. Bostock, b Kershaw	1
R. M. Scobie, b Kershaw	15
E. J. James, c and b Lascelles	0
C. W. Corem, not out	1
Byes 9, w 2	11
Total	108

R.A.C.	
L. F. Stobart, b Durand	27
H. E. Hippisley, l-b-w, b Barnes	27
C. M. Hoare, c Brown, b James	0
R. W. Wilson, b James	17
O. H. Lee-Lum, b Barnes	7
C. L. White, b James	0
M. Kershaw, c Durand, b Barnes	24
J. W. White, c Corem, b James	0
P. C. Done, c Barnes, b James	3
H. Lascelles, not out	0
A. H. V. Sudbury, c Shewen, b James	0
Byes 1, l-b 1, w 5, n b 4	11
Total	116

R.A.C. v. EAST GLOUCESTERSHIRE C.C.—The R.A.C. met the East Gloucestershire Cricket Club on the latter's ground on Wednesday, June 28th. The match resulted in a draw in favour of the College. The College won the toss, and batted first, Hippisley and Stobart going to the wickets. Stobart soon left, hitting his wicket in trying a late cut. Gay came and left clean bowled, the score being nine runs for two wickets. But on Hoare joining Hippisley the game took a different turn, three wickets being down for 84, Hoare playing very well for his 41, which was badly wanted. The next five batsmen gave no trouble to speak of, though they helped Hippisley on towards his century. Done played well for his 12, and when Rikh came in Hippisley still wanted 10 for his century. Rikh played a great game and they brought the total from 170 to 209 for the last wicket, and were still unbeaten, the innings being declared closed. Hippisley played extremely well for 112 not out. He only made one mistake, and that was when he was 111, so that it made no difference. He hit well all round the wickets, his score including eleven 4's. East Gloucester did not fare at all well against the bowling of Lascelles and Gay, six wickets being down for 34 runs, but they were unable to get all the side out, only seven wickets being down when stumps were drawn for the small total of 65. Gay was bowling very fast and none of the batsmen seemed at all happy against him. Lascelles was also bowling in great form, getting four wickets for 32. It was a pity there was not time to finish it out. Full score :—

R.A.C.	
L. F. Stobart, hit wkt, b Baines	4
H. E. Hippisley, not out	112
W. G. M. Gay, b Jewell	3
C. M. Hoare, c Baines, b Pitsin	41
A. W. Ferrand, b Pitsin	1
O. H. Lee-Lum, c Skelton, b Pitsin	0
R. W. Wilson, run out	6
C. L. White, b Martin	0
H. Lascelles, b Jewell	5
P. C. Done, b Pitsin	12
A. B. Rikh, not out	17
Byes 6, n b 2	8
Total (9 wickets)	209

EAST GLOUCESTERSHIRE.	
Capt. Skelton, b Lascelles	8
V. Barnett, c White, b Lascelles	11
C. H. Martin, b Gay	4
W. Baines, not out	23
E. S. Brown, b Gay	2
W. Jewell, b Lascelles	2
J. W. Hepple, c Done, b Gay	1
Col. H. T. Hay, c Hippisley, b Lascelles	3
O. Martin, not out	9
R. S. Woodhouse and Pitsin did not bat.	
Byes	2
Total	65

R.A.C. v. WYE AGRICULTURAL COLLEGE—The above match was arranged by Mr. L. Sutton of Reading, the two Colleges meeting for the first time on his cricket ground at Reading on July 5th. Mr. Sutton generously entertained the two teams to lunch and tea. Wye won the toss and batted first on a wicket which played rather badly at the start, the scoring being consequently rather slow. The first two wickets fell at the total, 36, and Haines and Gordon carried the score to 70, when Gay and Lascelles bowled in place of Sudbury and Kershaw, Gay quickly bowling Haines. Hatfield hit evenly for a short time until he was well bowled by Lascelles. Gordon played delightful cricket and when partnered by Neame, scored very rapidly. At the Luncheon interval Wye had lost 7 wickets for a score of 161. The innings finished soon after lunch for 170. Lascelles and Gay bowled exceedingly well, the former taking 5 wickets for 45, and the latter 3 for 28. The wicket had improved a great deal since the start and played much better at the opening of the College innings. Stobart and Hippisley were dismissed at the score of 21, Hippisley having scored 20; Gay and Hoare scored freely, and at 75 Hoare was run out to a clever throw in from the out-field. Corbett batted patiently until Gay was dismissed at 85, and when partnered by Kershaw, runs came very slowly. The partnership yielded 50 runs, Corbett losing his wicket at 132. With the score at 170 Kershaw was dismissed, having scored 55. The College required 1 run to win, with 3 wickets in hand, but the score remained the same until Sudbury, the last man in scored 2, the College thus winning by 1 wicket. Sudbury lost his wicket with the score at 173. The match was keenly contested throughout, and a very even game resulted in a win by a very narrow margin. Had the wicket played better at the start, the result might have been different. Both teams thoroughly enjoyed the game and were exceedingly grateful to Mr. Sutton for so kindly arranging the match and for entertaining the teams. The Principals of the two Colleges attended the match, together with a few members of the Staffs of both Colleges. It is to be hoped that in future years we shall be able to meet on the College grounds at Wye and Cirencester, provided that suitable arrangements can be made. Full score :—

WYE AGRICULTURAL COLLEGE.	
A. F. Hood-Daniel, c Ferrand, b Kershaw	19
A. W. Hastings, c Hippisley, b Sudbury	12
A. H. L. Haines, b Gay	15
G. M. Gordon, b Gay	43
C. E. Hatfield, b Lascelles	15
R. Edwards, l-b-w, b Lascelles	11
L. G. Neame, c Hoare, b Lascelles	22
F. S. Gregory, c Lee-Lum, b Gay	1
E. R. Garnett, not out	1
T. S. Rutherford, b Lascelles	0
R. H. Sharp, c Corbett, b Lascelles	5
Byes 17, l-b 5, w 4	26
Total	170

R.A.C.	
L. F. Stobart, c Neame, b Hatfield	1
H. E. Hippisley, c Haines, b Edwards	20
C. M. Hoare, run out	28
W. G. M. Gay, c Gordon, b Rutherford	32
A. Corbett, c Sharp, b Rutherford	16
A. W. Ferrand, c Edwards, b Sharp	6
M. Kershaw, b Rutherford	55
O. H. Lee-Lum, c Hatfield, b Edwards	4
Capt. Davy, b Rutherford	0
H. Lascelles, not out	1
A. H. V. Sudbury, b Rutherford	2
Byes 5, n b 3	8
Total	173

R.A.C. v. CIRENCESTER (12 a side).—The return match with the Town was played on the College ground on Saturday, July 8th, and resulted in a draw. The Town batted first on an exceedingly good wicket and soon lost Sewell, who was bowled by Lascelles. Runs came very slowly and Lascelles soon obtained Cornelius's wicket. Allen hit out merrily for his runs, but the feature of the innings was the display of Tovey, who reached his century after playing a very careful innings. Boulton and Tovey put on 170 runs, and after the former had reached his fifty, the innings was declared closed with the score of 276 runs for 4 wickets. Stobart and Hippisley opened the College innings, the score being 64 when Stobart was caught in the slips. Corbett stayed with Hippisley until nearly 100 runs were put on, and a further partnership with Sudbury took the score to 198. Sudbury played well for 41, when he was bowled by Tovey. Hippisley scored his runs all round the wicket, his score of 80 including eight 4's. Stumps were drawn at 6.45 p.m., the College score being 225 for 6 wickets, a heavy scoring match, thus ending in a draw. Full score :—

CIRENCESTER.	
C. O H. Sewell, b Lascelles	3
W. G. Tovey, not out	130
N. S. Cornelius, b Lascelles	8
W. H. Bambridge, c and b Hoare	28
C. Allen, b Lascelles	19
S. Boulton, not out	50
Byes 32, w 5, n b 1	38
Total	276

T. R. Mills, J. F. Lawson, F. Bridges, G. J. Baker, R. J. Mullings, and J, S. Lawson did not bat. Innings declared closed.

R.A.C.	
L. F. Stobart, c Bambridge, b Allen	15
H. E. Hippisley, b Mills	80
C. M. Hoare, b Mills	1
N. P. Corbett, c Cornelius, b Allen	39
A. H. V. Sudbury, b Tovey	41
S. E. M. Stobart, c Sewell, b Tovey	6
O. H. Lee-Lum, not out	5
M. Kershaw, not out	3
Byes 23, l-b 3, w 3, n b 6	35
Total	225

C. L. White, Capt. Davy, H. Lascelles, and A. B. Rikh did not bat.

R.A.C. v. T. MILLS'S XI.—This match was played on the College ground on July 12th, in delightful weather. The College were opposed to a very strong side and made a good fight, but lost by 81 runs. Hippisley lost the toss and so had to lead his side out to field. Kershaw and Lascelles started to bowl, Tufnell and Smart being the opposing bats. Runs came pretty quickly from the start, but on Gay relieving Kershaw, Smart was dismissed by a good catch by Sudbury in slips. Kershaw next next made a very good catch off Sudbury, Tufnell being the victim, 2 wickets for 84. After a short and bright innings T. Gay was well caught by Kershaw off W. Gay who was bowling very well. Lee-Lum held the next catch, a hard one off Gay at extra cover, sending Kenyon back to the pavilion, Kershaw relieved Gay a few overs later and bowled Pearson and soon afterwards Mills as well. Then Cornelius was well caught at the wicket by Corbett off Ferrand who had relieved Sudbury at the lower end. Then the luncheon came, the score standing at 237 for 7 wickets, the whole side were eventually dismissed for 320. Cornelius had played a splendid innings his score including 2 sixes and 9 fours. The College opened with Hippisley and Stobart to the bowling of Oliver and Tufnell, they scored 36 for the first wicket when Hippisley in trying a leg glide, mis-hit and sent an easy catch back to the bowler. Corbett did not stay long nor Gay either, 3 wickets being down for 45 runs, Hoare joined Stobart and they were not out at the tea interval. Soon after tea Hoare was bowled having had rather a lucky innings. Kershaw was caught at square leg, having hit the ball out of the ground once in his short stay. Sudbury then brightened things up and the score was brought to 146 when Stobart was caught at square leg by Pearson. Both Kershaw and Stobart were thus dismissed in the same way by very smart catches. Sudbury continued to play in great style, Ferrand keeping him company for some time. Lee-Lum and Davy were quickly sent back, Sudbury was last out having made a first rate 81, hitting fourteen 4's several of them being very close to being 6's, the whole side thus compiled 239 runs, quite a good total, but not good enough to win. The match was a great success in every way, the weather helping to make things even more enjoyable if that was possible. Full score :—

Mr. Mills's Team.	
N. C. Tufnell, c Kershaw, b Sudbury	45
R. Smart, c Sudbury, b W. Gay...	20
T. Gay, c Kershaw, b W. Gay ...	14
N. S. Cornelius, c Corbett, b Ferrand	71
M. N. Kenyon, c Lee-Lum, b W. Gay	21
T. A. Pearson, b Kershaw ...	21
T. R. Mills, b Kershaw	14
H. Adamthwaite, b Gay	25
G. M. Gibbs, b Sudbury,... ...	10
R. Gibbs, c Hoare, b Lascelles ...	28
E. Olivier, not out...	0
Extras	51
Total	320

R.A.C.	
L. F. Stobart, c Pearson, b Olivier	64
H. E. Hippisley, c and b Olivier...	17
N. E. F. Corbett, b Olivier ...	3
W. G. M. Gay, c and b Tufnell ...	1
C. M. Hoare, b Olivier	19
M. Kershaw, c Pearson, b Olivier	10
A. H. V. Sudbury, b Olivier ...	81
A. W. Ferrand, b Tufnell... ...	9
O. H. Lee-Lum, b Tufnell ...	2
Capt. Davy, c Tufnell, b Olivier...	0
H. Lascelles, not out	1
Extras...	32
Total	239

R.A.C. v. STROUD.—The return match was played on the College ground on July 15th, in fine weather, and resulted in a win for the College by 76 runs. The College won the toss and Hippisley opened their innings with Stobart. Hippisley was soon caught cover with the score at 8, and 5 wickets were down for 43 runs when Sudbury and Lascelles came together and made things brighter, putting on 53 for the 6th wicket. Done also helped to increase the score, the next wicket adding 51. Pritchard stayed some time and helped Sudbury to bring his total to 73. Sudbury was last out having made a splendid 73, which was badly needed at a very critical period of the game, and he is to be much congratulated on his fine performance. Stroud were soon dismissed owing to the fine bowling of Kershaw and Sudbury, the former especially bowling very well indeed. Full score :—

R.A.C.	
L. F. Stobart, b Poole	15
H. E. Hippisley, c Smith, b Poole	6
C. M. Hoare, l-b-w, b Poole ...	6
M. Kershaw, b Huggins	9
O. H. Lee-Lum, b Huggins ...	0
A. H. V. Sudbury, b Huggins ...	73
H. Lascelles, c and b Poole ...	26
P. C. Done, b Huggins	24
Capt. Davy, c Halliday, b Poole...	5
H. A. Pritchard, b Huggins ...	3
C. L. White, not out	2
Extras	17
Total	186

Stroud.	
C. M. Smith, c Lee-Lum, b Kershaw	14
E. G. Wichens, b Sudbury ...	2
J. Halliday, b Sudbury	1
— Poole, b Sudbury	5
G. W. Holloway, not out... ...	47
— Huggins, c Hippisley, b Kershaw	1
S. M. Gregory, b Kershaw ...	0
Rev. F. C. de Beauvais, c and b Kershaw...	9
D. Macdonald, b Kershaw ...	1
W. G. Dredge, c Davy, b Kershaw	12
C. E. Fry, b Sudbury	1
Extras	21
Total	110

R.A.C. v. CHELTENHAM.—The return match was played at Cheltenham on July 19th, and resulted in a draw. The College were unfortunately without the services of Hippisley, Lascelles, and Lee Lum. Cheltenham won the toss and batted first, but they soon lost two wickets for 12 runs, both caught off Sudbury's bowling, Sabit's catch being a very nice one-hander. The ground was fast and runs came easily. They declared at 227 with six wickets down, leaving the College to get the runs in 1½ hours. Stobart and Wilson opened the innings and ran everything, putting on 65 for the first wicket; 110 runs were on the board in three-quarters of an hour. Hoare and Kershaw both played well, but the College were unable to get the runs in the time, getting 201 for the loss of 7 wickets. Stobart played a good innings for his 83 not out. Full score:—

CHELTENHAM.

H. G. Holder, c Sabit, b Sudbury	7
H. O. Barnett, c Capt. Davy, b Sudbury	3
H. Gardner, st Corbett, b Hoare	33
S. Wood, c Hoare, b Kershaw	68
S. Rust, b Hoare	19
Dr. A. Dighton, b Vaughan	23
V. Barnett, not out	14
W. Wood, not out	20

E. O. Browning, E. Browning, and Yiend did not bat. Innings declared closed.

Extras	40
Total for 6 wickets	227

R.A.C.

L. F. Stobart, not out	83
R.W.Wilson, c Gardner, b Holder	39
N. E. F. Corbett, c Gardner, b Wood	0
C. M. Hoare, b Yiend	24
A. H. V. Sudbury, b Yiend	0
M. Kershaw, b Yiend	34
E. M.Mansell-Pleydell, c Barnett, b Yiend	4
Capt. Davy, b Yiend	6

H. A. Pritchard, Vaughan, and Y. Sabit did not bat

Extras	11
Total for 7 wickets	201

BATTING AVERAGES.

Name.	No. of Runs.	No. of Innings.	Times not out.	Most in an Innings.	Average.
a H. E. Hippisley	571	17	2	112*	38
L. F. Stobart	465	19	3	83*	29
N. E. F. Corbett	114	5	0	56	22.8
A. H. V. Sudbury	260	14	2	81	21.6
W. G. M. Gay	117	7	1	47*	19.5
H. Lascelles	67	10	6	26	16.7
C. M. Hoare	230	16	1	41	15.3
M. Kershaw	240	18	2	55	15
R. W. Wilson	92	7	0	39	13.1
A. W. Ferrand	92	11	0	29	8.3
O. H. Lee Lum	106	16	2	22	7.5
A. B. Rikh	45	10	4	17*	7.4
P. C. Done	42	7	0	24	6
Prof. Pritchard	21	5	1	17*	5.2
Captain Davy	43	11	0	14	3.9
C. L. White	30	10	2	14	3.7

a Average bat. * Signifies "not out."

BOWLING AVERAGES.

Name.	Overs.	Runs.	Wickets.	Average runs per wicket.
W. G. M. Gay	55	201	20	10
M. Kershaw	227	753	61	12.3
H. Lascelles	90	413	28	14.7
A. H. V. Sudbury	166	568	34	16.7
A. W. Ferrand	42	163	7	23.3
C. M. Hoare	49	233	8	29.1

L. F. Stobart 2 wickets for 60 runs, and O. H. Lee Lum, 1 wicket for 71 runs.

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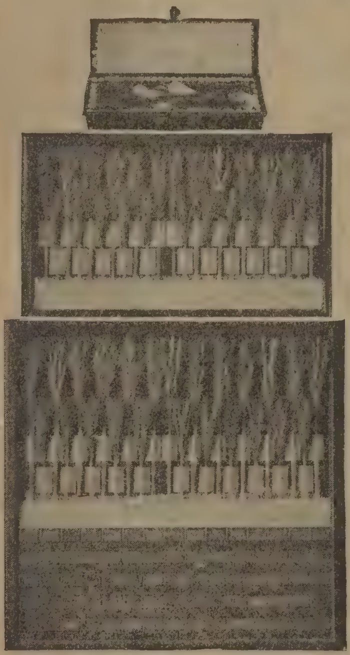

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STUDENTS AT THE ROYAL AGRICULTURAL COLLEGE,
CIRENCESTER.

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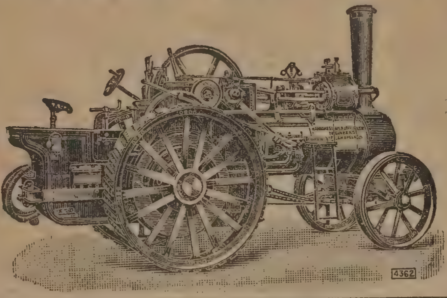

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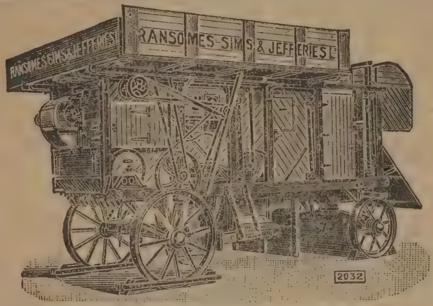

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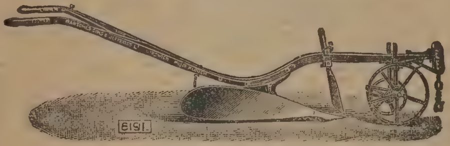

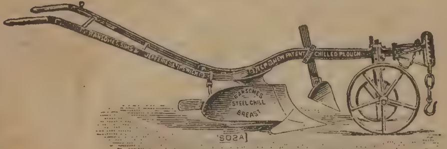

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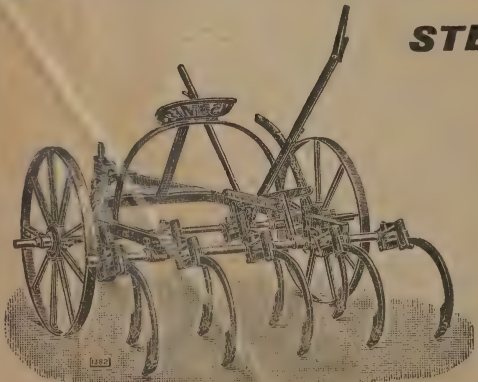

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Agricultural Students' Gazette.

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R.A.C. BUILDING EXTENSION FUND.

Following on a promise from the Development Commissioners to advance a sum of money, not exceeding £5,000, on certain conditions mentioned below, the Governors of the College are issuing a preliminary appeal for donations, in the following form :—

" From its foundation in 1845 until 1908 the pioneer Agricultural " College carried on its work entirely without financial aid from public " sources and without endowments, save two small funds for providing an entrance scholarship in memory of Robert Jefferys " Brown (to whom the foundation of the College was mainly due), " and a gold medal to keep in grateful recollection William Holland, " of Dumbleton, one of the Founders, first President of the Council, " and a most generous benefactor. Towards the end of the period " named the competition of numerous State-aided institutions " rendered reorganisation necessary, and the College is now in receipt " of a substantial grant from the Board of Agriculture, and is associated " with the University of Bristol for the purpose of instruction for " degrees and diplomas in Agriculture and Forestry. The College " has also recently been recognised by the Board of Agriculture, on " the recommendation of the Development Commissioners, as the " Advisory Centre in Forestry for a very large district, including " the Counties of Worcester, Hereford, Glamorgan, Monmouth, " Gloucester, Wilts, Somerset, Devon, and Cornwall.

" The present buildings were completed at a time when laboratory " work in biological sciences (including bacteriology) was deemed " unnecessary, and Forestry instruction was not undertaken, and " it has been felt by the Governors with increasing urgency, especially " in view of growing numbers, that the time has come for the erection " of a new wing, making provision for larger lecture rooms, biological " and other laboratories of more modern type, a drawing office, " a Forestry museum, and so forth, and it is estimated that the cost " of this extension, together with necessary improvements of the " Veterinary Hospital and Workshops, will amount to the sum of " £10,000.

" It has always been the policy of the College to engage men of " the highest qualifications as members of its staff, but it is realised " that in order to utilise their energies and abilities to the full, lecture " rooms and laboratories of the most modern and commodious kind " should be placed at their disposal for the purposes of education and " research.

" In response to an appeal for assistance to the Development " Commissioners, the Lords of the Treasury have recommended "that an advance of half the sum required for the erection of the new buildings (not exceeding £5,000) be made from the Development Fund to the College for this purpose, on condition that the College works in conjunction with the University of Bristol under a scheme approved by the Board of Agriculture, and that the balance of the sum required to complete the buildings should be obtained by subscriptions and donations from outside sources, and not be raised by the College itself as a loan.

"This appeal is made in order to preserve the advantages of the College as an Imperial Institution, and to enhance the world-wide reputation gradually established by continuous and patient labour for nearly 70 years.

"The whole body of Governors of the Royal Agricultural College, whose names are hereto appended, fully realise their responsibilities and the importance of collecting at least the sum of £5,000 named, and therefore most earnestly and confidently appeal to the public at large, and to those interested in Agricultural and Forestry Education and Research in particular, for adequate assistance necessary to enable them to complete the work indicated, and so take advantage of the Government grant now offered.

"Promises of support and donations, in addition to those already received, should be sent to the Secretary, or direct to the R.A.C. Building Fund, Lloyds Bank, Cirencester, the Manager of which, W. Wearing, Esq., is kindly acting as Honorary Treasurer.

"*Hereditary Governor*—
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We trust that our readers will all assist in furthering this object to keep their beloved R.A.C. still in the front rank, and will try and interest their more wealthy friends in the proposed scheme.

EDITOR.

MANURING EXPERIMENTS ON GRASS FOR HAY.

(Carried out on different farms in Gloucestershire with the aid of the Sulphate of Ammonia Committee.)

The experiments were carried out on six farms, viz. :—

1. Royal Agricultural College Farm, Cirencester.
2. Dry Leaze Farm, Cirencester, by J. A. Attwater, Esq.
3. Hill House Farm, Sapperton, Cirencester, by Dr. Thomas Douglas.
4. Swyre Farm, Aldsworth, Northleach, by the Hon. M. H. Hicks Beach, M.P.
5. Farm at Tarlton, Cirencester, by Mr. G. H. Ractliffe.
6. The Green Farm, Great Witcombe, Gloucester, by Mr. E. J. Staples.

In each case, six plots of one-tenth of an acre were used, the manures being applied as in the following scheme, per acre :—

1.	2.	3.	4.	5.	6.
No Artificials.	Superphosphate, 4 cwt. Potassium Sulphate, 1 cwt.	Superphosphate, 4 cwt. Potassium Sulphate, 1 cwt. Ammonium Sulphate, 1½ cwt.	No Artificials.	Superphosphate, 4 cwt. Potassium Sulphate, 1 cwt.	Superphosphate, 4 cwt. Potassium Sulphate, 1 cwt. Ammonium Sulphate, 1½ cwt.

Royal Agricultural College Farm, Cirencester.

On Chapel Close ; the soil is a calcareous loam overlying the Great Oolite, and is generally deeper and damper towards the east side of the field (Plot 7). The average depth of the soil, on the plots, is from 8—10 inches, with about 7 per cent. of carbonate of lime. The field is 430 feet above sea level. It has been down to permanent grass for a great many years, and, generally, one crop of hay is taken each year and afterwards grazed. All the plots had received farmyard manure at the rate of 10 tons per acre during the previous winter.

The superphosphate and potassium sulphate were applied on March 12th, and the sulphate of ammonia on April 15th.

The great deficiency of rain in April and the first half of May threatened a very scanty yield of hay ; however, later in May and early in June sufficient rain fell to produce a fair crop ; the bottom grasses coming on well.

The grass was cut on June 20th, and the hay weighed and harvested on June 28th, in very fair condition, although 1·2 inches of rain fell between cutting and harvesting.

The yield of hay per acre was :—

		Hay per acre—cwts.
Plot 1.	No artificials	26·2
Plot 2.	Phosphate and potash	26·8
Plot 3.	Phosphate, potash, and sulphate of ammonia	29·8
Plot 4.	As Plot 1	22·7
Plot 5.	As Plot 2	23·5
Plot 6.	As Plot 3	30·7

The average yield, per acre :—

No artificials	24·4
Superphosphate and potash	25·1
Superphosphate, potash, and sulphate of ammonia	30·3

Comparison of the Botanical Composition of the Herbage of Grass Land at Royal Agricultural College (Chapel Close), under differential manurial treatment.

	I.	II.	III.
Bromus erectus (Upright Brome)	70·8	63·9	53·7
Bromus mollis (Soft Brome)	1·4	—	1·2
Festuca ovina var. (Sheep's Fescue)	9·1	5·6	14·0
Dactylis glomerata (Cocksfoot)	6·3	2·7	3·6
Lolium perenne (Perennial Rye Grass)	1·2	1·3	10·7
Avena flavescens (Golden Oat Grass)	1·1	1·4	4·2
Avena pubescens (Downy Oat Grass)	·1	·1	·2
Poa trivialis (Rough-stalked Meadow Grass) }	3·8	6·2	7·0
Poa pratensis (Smooth-stalked Meadow Grass) }			
Phleum pratense (Timothy)	—	·3	—
Agrostis stolonifera (Fiorin, Creeping Bent)	—	—	·2
TOTAL GRAMINÆ	93·8	81·5	94·8
Trifolium repens (White Clover)	1·1	1·9	2·4
Trifolium pratense (Red Clover)	·4	·9	·1
Trifolium minus (Yellow Suckling Clover)	·1	·2	—
Lathyrus pratensis (Meadow Vetchling)	1·6	13·9	1·7
Lotus corniculatus (Bird's-foot Trefoil)	1·0	—	—
TOTAL LEGUMINOSÆ	4·2	16·9	4·2
Ranunculus bulbosus (Bulbous Buttercup)	1·4	·3	·2
Cerastium triviale (Mouse-ear Chickweed)	·2	·4	·2
Galium verum (Ladies' Bedstraw)	·2	·6	·5
Potentilla reptans (Silver Weed)	·1	—	·1
Taraxacum vulgatum (Dandelion)	·1	·1	—
Carduus acaule (Thistle)	—	·2	—
TOTAL WEEDS	2·0	1·6	1·0

Soil depth 8–10 inches.
Calcium Carbonate about 7 %.
I.—Unmanured Plot.
II.—Potassium Sulphate (1 cwt.) and Superphosphate (4 cwt.).
III.—Potassium Sulphate (1 cwt.) and Superphosphate (4 cwt.) and Ammonium Sulphate (1½ cwt.).

It will be seen that the application of the phosphate and potash, whilst producing hardly any effect on the total yield of hay in the following crop, has largely increased the proportion of leguminous herbage, and notably of Meadow Vetchling, and has proportionately reduced the grasses ; the grasses which have decreased being Upright Brome, Cocksfoot, and Sheep's Fescue ; Meadow Grasses (Poas) have increased.

When sulphate of ammonia is given in addition to the ash constituents, the total yield of hay is distinctly raised, the leguminous plants are reduced to their former level, and the proportion of purely gramineous herbage restored but with an alteration in the proportion of the individual grasses, thus, the rather poor grass—Upright Brome—is decreased, whilst Perennial Rye Grass, Sheep's Fescue, and the Poas are encouraged.

The aftermath was abundant, and especially on the plots that had received sulphate of ammonia with phosphates and potash.

MR. J. A. ATTWATER'S FARM, DRY LEAZE, CIRENCESTER.

Pool Tudmoor Field, about 300 feet above sea level, a calcareous loam on the corn brash : soil deep, with 1·3 per cent. of calcium carbonate. The field had been down to grass for four years, and had been recently manured with a dressing of sewage sludge.

The field, generally, was in poor condition, patchy, with many weeds, Black Bent Grass and Brome Grasses (*Bromus sterilis* and *B. erectus*).

Plots 4, 5, and 6 were especially patchy and weedy, and the results of the weighing were not worth recording.

Plots 1, 2, and 3 were more uniform. The plots were visited several times with Mr. Stapledon.

On Plot 1 the Bromes largely predominated. On Plot 2 there was rather more grass and distinctly more clover. Plot 3 showed more growth, and that chiefly of grasses with the Bromes still predominant.

The grass was cut on June 21st, and the hay weighed on June 27th, it being rather damp.

The yield of hay per acre was as follows :—

		Hay in cwts.
Plot 1.	No artificials	23·2
Plot 2.	Superphosphate and potassium sulphate	27·7
Plot 3.	Superphosphate, potassium sulphate, and sulphate of ammonia	38·0

A good increase of hay for the manuring, though the quality was poor.

DR. THOMAS DOUGLAS' FARM, HILL HOUSE, SAPPERTON, CIRENCESTER.

A poor calcareous loam on the Oolite, down to grass about 30 years, fed off last autumn, nearly 600 feet above sea level.

Farm-yard manure was applied on all the plots at the rate of 12 loads to the acre.

The superphosphate and potash were applied on March 20th on plots 2, 3, 5 and 6, and the sulphate of ammonia on plots 3 and 6 on April 12th.

Until after rain in the second half of May, the growth of grass was poor, then the plots manured with artificials showed up, and especially so the plots receiving sulphate of ammonia in addition to cinereals.

The grass was cut on July 10th, and the hay weighed in excellent condition on July 15th.

The yield of hay per acre was as follows :—

		Hay—Cwts.
Plot 1.	No artificials	16·8
Plot 2.	Superphosphate and potassium sulphate	18·7
Plot 3.	Superphosphate, potassium sulphate, and sulphate of ammonia	26·2
Plot 4.	As Plot 1	12·4
Plot 5.	As Plot 2	17·0
Plot 6.	As Plot 3	25·4

The average yields per acre were :—

Farm-yard manure only (1 and 4)	14·6
Ditto and cinereals (2 and 5)	17·8
Ditto and ditto and sulphate of ammonia (3 and 6)	25·8

This shows a large increase for the manuring with ammonium sulphate, in conjunction with cinereals, in the first crop, and the aftermath, which was fed off, was distinctly better and more relished on the more heavily manured plots.

Here we had the assistance of Mr. B. Douglas.

The Hon. M. H. Hicks Beach's, Swyre Farm, Aldsworth, Northleach.—Bailiff, Mr. J. Cripps.

Wall Grattan's Field. Mixed seeds for hay, following oats, these after swedes. Soil, stone brash, fairly deep on Great Oolite, with a northern exposure, about 450 feet above sea level.

The superphosphate and potash were sown on March 14th, and the sulphate of ammonia on April 15th.

Throughout the cinereals showed very little effect, but in the early part of June, after rains, the plots receiving the ammonia showed up very plainly. The grass was cut on July 3rd, weighed and harvested on July 10th in good condition. Afterwards the field was closely grazed with sheep.

The yield of the respective plots, in cwts. of hay per acre, was as follows :—

		Hay—Cwts.
Plot 1.	No artificials	14·7
Plot 2.	Superphosphate and potassium sulphate	13·2
Plot 3.	Superphosphate, potassium sulphate and ammonium sulphate	22·8

	Hay—Cwts.
Plot 4. As Plot 1	13·6
Plot 5. As Plot 2	14·5
Plot 6. As Plot 3	23·4

The average yield per acre :—

Unmanured	14·0
Phosphate and potash	13·9
Phosphate, potash, and sulphate of ammonia	23·1

Whilst the phosphate and potash alone did not increase the yield, the addition of the sulphate of ammonia increased the weight of hay by 9 cwt. per acre.

On these plots we had the assistance of Mr. Christopher Comely, M.R.A.C., who paid several visits and weighed the hay.

Mr. G. H. Ractliffe's Farm at Tarlton, Cirencester.

On Chapel Ground, stone brash on Oolite, fairly deep soil, carbonate of lime abundant. Old grass land fed off with horses till spring. Visited several times with Professors Pritchard and Stapledon, the latter of whom made a botanical analysis of the plots.

The cinereals were applied on March 12th, the sulphate of ammonia on April 15th.

The grass was cut on July 4th, and the hay weighed on July 11th.

The result of each plot, calculated to cwts. of hay per acre, was thus :—

	Hay—Cwts.
Plot 1. Unmanured	26·5
Plot 2. Superphosphate and potash	24·7
Plot 3. Superphosphate, potassium sulphate, and sulphate of ammonia	27·9
Plot 4. As Plot 1	20·3
Plot 5. As Plot 2	30·0
Plot 6. As Plot 3	43·2

The average yield per acre was :—

Unmanured	23·4
Superphosphate and sulphate of potash	27·3
Superphosphate, sulphate of potash, and sulphate of ammonia	35·5

An adjoining plot, receiving five cwt. of basic slag, gave a weight of hay practically equal to those receiving superphosphate and potash. Here the use of phosphates and potash somewhat increased the yield of hay, but it had a marked influence in improving the quality ; the leguminosæ were greatly increased, at the expense of both the grasses and weeds. Red clover, White Clover, Yellow Suckling Clover and Meadow Vetchling all increased very markedly, only Bird's Foot Trefoil diminishing in proportion. The diminution in the grasses fell principally on the Rye Grass, and in the weeds on the Buttercups and Silver Weed.

When ammonium sulphate was used as well as cinereals there was a very considerable increase in the total yield, the grasses being encouraged, especially Sheep's Fescue ; the leguminous plants remained nearly stationary, though *Lotus corniculatus* diminished ; but the weeds largely decreased, especially Buttercups and Silver Weed.

Comparison of the Botanical Composition of the Herbage of Grass Land at Tarlton, Cirencester, Mr. Ractliffe's (Chapel Ground), under differential manurial treatment.

	I.	II.	II.B.	III.
Bromus mollis (Soft Brome)	—	·5	—	·3
Alopecurus pratensis (Meadow Foxtail) ...	—	·1	·1	·1
Festuca ovina var. (Sheep's Fescue)... ...	6·2	8·1	5·3	14·0
Dactylis glomerata (Cocksfoot)	18·5	17·6	13·9	21·1
Lolium perenne (Perennial Rye-grass) ...	29·3	16·1	32·4	28·3
Avena flavescens (Golden Oat Grass) ...	11·3	9·1	8·8	11·3
Avena pubescens (Downy Oat Grass) ...	—	·1	—	·2
Poa trivialis (Rough-stalked Meadow Grass) ... ... Poa pratensis (Smooth-stalked Meadow Grass	6·2	5·4	2·1	8·7
Phleum pratense (Timothy)	·3	—	—	·5
Agrostis stolonifera (Fiorin, Creeping Bent)	·2	·3	·2	·3
Cynosurus cristalus (Crested Dog's Tail) ...	4·3	3·0	4·5	2·6
Holcus lanatus (Yorkshire Fog)	—	·1	·6	·5
TOTAL GRAMINÆ	76·3	60·4	67·9	87·9
Trifolium repens (White Clover)	·5	4·3	2·4	1·4
Trifolium pratense (Red Clover)	2·1	9·8	3·0	3·7
Trifolium minus (Yellow Suckling Clover)	1·9	8·6	10·8	1·5
Lathyrus pratensis (Meadow Vetchling) ...	·9	4·7	3·7	·2
Lotus corniculatus (Bird's-foot trefoil) ...	5·2	2·5	·7	2·2
Vicia sativa (Vetch)	—	2·0	—	—
TOTAL LEGUMINOSÆ ...	10·6	31·9	20·6	9·0
Ranunculus bulbosus (Bulbous Buttercup)	7·0	3·6	4·3	1·0
Cerastium triviale (Mouse-ear Chickweed)	1·0	1·2	1·3	1·0
Galium verum (Ladies' Bedstraw)	·7	·5	·8	·7
Potentilla reptans (Silver Weed)	2·1	·4	·6	—
Luzula campestris (Field Woodrush) ...	—	—	·1	—
Rumex acetosa (Sorrel or Sour Dock) ...	·2	—	—	—
Plantago lanceolata (Rib-grass)	—	—	1·0	—
Primula veris (Cowslip)	—	—	·5	—
Taraxacum vulgatum (Dandelion)	—	—	·3	—
Carduus acaule (Thistle)	—	—	·1	—
Convolvulus arvensis (Small Bindweed) ...	2·1	2·0	2·5	·4
TOTAL WEEDS	13·1	7·7	11·5	3·1

Soil depth about 20 inches.
Calcium Carbonate abundant.

I.—Unmanured Plot.
II.—Potassium Sulphate (1 cwt.) and Superphosphate (4 cwt.)
II.B.—Basic Slag (4 cwt.).
III.—Potassium Sulphate (1 cwt.), Superphosphate (4 cwt.), and Ammonium Sulphate (1½ cwt.).

Mr. E. J. Staples, The Green Farm, Great Witcombe, Gloucester.

A stiff loam on clay subsoil, about 350 feet above sea level. An old grass field, which has been mown yearly and but little manure used, till lately has been badly treated in that respect ; much Yellow Rattle in the field. All the field received farm-yard manure at the rate of 12 tons per acre.

The phosphates and potash were sown on March 12th, the sulphate of ammonia on April 11th.

During growth, it was seen that the added manure very distinctly improved the quality of the herbage, and diminished the amount of Yellow Rattle. With the sulphate of ammonia, there was an increased show of grass. The grass was cut on July 22nd, but the hay could not be weighed for nearly a month, during which time it was wetted and nearly dried several times.

The improvement, due to the extra manure, was noticeable even more in the quality than in the quantity of the yield.

The yield of each plot, calculated to cwts. of hay per acre, was :—

		Hay—Cwts.
Plot 1.	No artificial	36·0
Plot 2.	Superphosphate and potassium sulphate	40·9
Plot 3.	Superphosphate, potassium sulphate and sulphate of ammonia	43·0
Plot 4.	As Plot 1	37·7
Plot 5.	As Plot 2	41·7
Plot 6.	As Plot 3	43·5

The averages being :—

No artificials	36·8
Phosphate and potash	41·3
Phosphate, potash, and sulphate of ammonia ...	43·2

Here we had the assistance of Mr. E. G. Staples, M.R.A.C., who also weighed the produce.

MANURING EXPERIMENTS ON GRASS LAND.

Permanent Pasture.

(Carried out on different farms in Gloucestershire and Wiltshire with the aid of the Sulphate of Ammonia Committee.)

These were carried out at two farms, viz. :—

1. Church Farm, at Latton, Cricklade, Wilts, by Sydney Dennis, Esq.
2. Dry Leaze Farm, Cirencester, by J. A. Attwater, Esq.

Botanical examinations and determinations were made here and also on two other farms where the grass was cut for hay.

The plots were one-tenth of an acre, but the amounts of manure are given per acre.

1.	2.	3.
Unmanured.	Superphosphate, 4 cwt. Potassium Sulphate, 1 cwt.	Superphosphate, 4 cwt. Potassium Sulphate, 1 cwt. Ammonium Sulphate, 1½ cwt.

Mr. Sydney Dennis's, Church Farm, Latton, Wiltshire.

On Sidnells Field, a calcareous loam about 12 inches deep, with 16 per cent. calcium carbonate on the Oxford clay, about 270 feet above sea level. On one side is Ampney Brook, a tributary of the Thames. The field is always fed off. The plots were visited on February 14th, April 6th, June 1st, and October 12th.

The superphosphate and potassium sulphate were applied on March 12th, and the sulphate of ammonia on April 15th.

The botanical analysis was made the first week in June.

Comparison of the Botanical Composition of the Herbage of Grass Land at Latton, Cricklade, Sydney Dennis, Esq. (Sidnells), under differential manurial treatment.

	I.	II.	III.
Briza media (Quaking Grass)	1·5	1·4	2·0
Alopecurus pratensis (Meadow Foxtail)	1·6	2·1	5·2
Festuca ovina var. (Sheep's Fescue)	18·2	18·0	24·7
Dactylis glomerata (Cocksfoot)	7·6	8·0	6·2
Lolium perenne (Perennial Rye Grass)	2·1	1·7	4·6
Avena pubescens (Downy Oat Grass)	10·5	6·1	1·7
Avena flavescens (Golden Oat Grass)	3·1	4·3	3·0
Arrhenatherum elatior (Tall Oat Grass)	4·8	2·1	5·0
Poa trivialis (Rough-stalked Meadow Grass) ...	1·7	·7	5·4
Phleum pratense (Timothy)	—	—	·1
Agrostis stolonifera (Fiorin, Creeping Bent)... ...	10·0	13·3	15·9
Cynosurus cristatus (Crested Dogstail)	3·1	1·4	·9
Holcus lanatus (Yorkshire Fog)	·2	—	2·5
Aira caespitosa (Tussock Grass)	·5	2·8	·1
TOTAL GRAMINÆ	64·9	61·9	77·3
Trifolium repens (White Clover)...	10·3	16·0	5·1
Lathyrus pratensis (Meadow Vetchling) ...	3·6	1·9	3·1
Lotus corniculatus (Bird's-foot Trefoil) ...			
TOTAL LEGUMINOSÆ ...	13·9	17·9	8·2
Ranunculus bulbosus (Bulbous Buttercup)	3·0	2·3	1·2
Cerastium triviale (Mouse-ear Chickweed)	·5	—	·1
Galium verum (Ladies' Bedstraw)	·3	2·0	1·4
Potentilla reptans (Silver Weed)	1·0	—	1·0
Chrysanthemum leucanthemum (Ox-eye Daisy) ...	—	2·2	1·2
Spirea ulmaria (Meadow Sweet)...	1·2	1·4	·9
Luzula campestris (Field Woodrush)	·1	2·0	1·5

	I.	II.	III.
Achillea millifolium (Yarrow)	2·0	·8	1·5
Veronica chamaedrys (Germander Speedwell)	7·4	3·4	3·3
Ajuga reptans (Bugle)	1·3	3·4	1·4
Rumex acetosa (Sorrel or Sour Dock)	·2	·1	·9
Plantago lanceolata (Rib Grass)	2·7	1·2	—
Primula veris (Cowslip)	·3	—	—
Lysimachia nummularia (Yellow Loosestrife)	1·2	—	—
Taraxacum vulgatum (Dandelion)	—	·8	—
Poterium sanquisorba (Burnet)	—	·6	·1
Total Weeds...	21·2	20·2	14·5

Soil depth about 12 inches.
Calcium Carbonate 16 %.
I.—Unmanured Plot.
II.—Potassium Sulphate (1 cwt.) and Superphosphate (4 cwt.).
III.—Potassium Sulphate (1 cwt.) and Superphosphate (4 cwt.) and Ammonium Sulphate (1½ cwt.).

Here the effect of the application of phosphate and potash was to increase the leguminous herbage, especially the White Clover, the proportion of grasses and weeds being both slightly diminished.

When ammonium sulphate was added to the phosphate and potash the total amount of growth was considerably increased, and this was plain throughout the season; also, the proportion of leguminosæ and weeds was decreased, and the gramineous herbage increased.

The grasses, which increased most, were Sheep's Fescue and Creeping Bent (*Agrostis*), but Meadow Foxtail, Perennial Rye Grass, Rough Stalked Meadow Grass, and Yorkshire Fog also increased, whilst Downy Oat Grass diminished in amount.

White Clover was diminished to one-half, but Bird's Foot Trefoil held its own.

Of the weeds, Buttercups and Germander Speedwell showed the greatest decrease, and Plantains disappeared.

Mr. J. A. Attwater's, Dry Leaze Farm, Cirencester.

On Big Home Ground, a rather heavy clay soil, two to three feet deep, containing about 1·3 per cent. of carbonate of lime; always fed off. On one-half of each of these plots, powdered chalk was applied in March with marked good effect.

The superphosphate and sulphate of potassium were applied on March 6th, and the sulphate of ammonia on April 11th.

On this field, the application of phosphate and potash very greatly increased the growth of White Clover, and the proportion of grasses being correspondingly decreased. The grasses which decreased most were Upright Brome and Rough Stalked Meadow Grass. Weeds did not alter much, though there was a tendency for Yarrow to increase.

With the use of sulphate of ammonia in addition to the cinereals, the total growth of herbage was greatly increased and, although the field was grazed the whole season, this showed throughout.

The proportion of leguminous herbage was considerably diminished, the contrast between Plots 2 and 3 in this respect being very marked; weeds were diminished, Buttercups being nearly banished; but the grasses were increased and altered in their proportions to each other. Perennial Rye Grass increased very much and became from about one-tenth up to nearly one-quarter of the entire weight of herbage. Meadow Foxtail largely increased, whilst Upright Brome and Rough Stalked Meadow Grass decreased, as also did Crested Dogstail.

Comparison of the Botanical Composition of the Herbage of Grass Land at Dry Leaze Farm, Cirencester, J. Attwater, Esq. (Big Home Ground), under differential manurial treatment.

	I.	II.	III.
Bromus erectus (Upright Brome)	8·2	1·0	1·5
Alopecurus pratensis (Meadow Foxtail)	3·4	5·0	10·0
Festuca ovina var. (Sheep's Fescue)	24·6	23·3	23·6
Dactylis glomerata (Cocksfoot)	4·1	9·0	7·3
Lolium perenne (Perennial Rye Grass)	10·6	10·0	23·8
Avena flavescens (Golden Oat Grass)	3·4	1·8	4·4
Poa trivialis (Rough-stalked Meadow Grass) ...	14·0	3·7	5·7
Poa pratensis (Smooth-stalked Meadow Grass) ...	·3	·2	·2
Phleum pratense (Timothy)	—	—	·1
Agrostis stolonifera (Fiorin, Creeping Bent) ...	3·2	·6	2·8
Cynosurus cristatus (Crested Dogstail)	3·5	4·6	1·5
Holcus lanatus (Yorkshire Fog)...	·7	1·6	1·9
Total Gramineæ	76·0	60·8	82·8
Trifolium repens (White Clover)	13·2	30·7	10·8
Trifolium pratense (Red Clover)...	1·0	—	—
Lathyrus pratensis (Meadow Vetchling)	2·5	1·2	·2
Lotus corniculatus (Bird's-foot Trefoil)	·1	—	1·4
Total Leguminosæ ...	16·8	31·9	12·4
Ranunculus bulbosus (Bulbous Buttercup)	2·0	1·8	·5
Galium verum (Ladies' Bedstraw)	—	1·6	1·8
Potentilla reptans (Silver Weed)	·8	—	—
Luzula campestris (Field Woodrush)	·1	—	—
Carex glauca (Carnation Grass)	1·9	·7	—
Achillea millifolium (Yarrow)	—	2·3	1·9
Veronica chamaedrys (Germander Speedwell) ...	—	·1	—
Rumex acetosa (Sorrel or Sour Dock)	·3	—	—
Plantago lanceolata (Rib Grass)...	1·1	·7	·6
Primula veris (Cowslip)	—	·1	—
Conopodium majus (Pignut)	1·0	—	—
Total Weeds...	7·2	7·3	4·8

Soil depth 2–3 feet.
Calcium Carbonate 1–3 %.

I.—Unmanured Plot.
II.—Potassium Sulphate (1 cwt.) and Superphosphate (4 cwt.).
III.—Potassium Sulphate (1 cwt.) and Superphosphate (4 cwt.) and Ammonium Sulphate (1½ cwt.).

On part of each Plot Calcium Carbonate applied, March 14th, with good effect.

BOTANICAL ANALYSES.

As shown above, the grass plots at four of the centres were analysed in the first or second week of June by Mr. R. G. Stapledon, with a view to finding out the effect of the manures on the component species of herbage. The average figures, given by the chief contributing species for the plots where they occur in any quantity, are shown in the above tables.

The plots at Latton and at Dry Leaze were analysed by counting the individual plants per unit of area, the percentages being calculated on this basis. The plots at the R. A. College and at Tarlton were examined by sorting and weighing the cut produce. The general results point to the following conclusions :—

(1) The dressing with superphosphate and potassium sulphate (cinereals) has more than doubled the percentage of Leguminosæ, but has rarely had any depressing influence on the percentage of weeds. Dutch Clover and Meadow Vetchling have generally reacted best ; on one plot, Red Clover and Yellow Suckling Clover have both reacted well. Dutch Clover appears to have reacted best on the deeper soils, whilst Meadow Vetchling has greatly increased on the shallow soil.

At the single centre, Tarlton, where this dressing has been compared with basic slag, the superphosphate plus potash has proved the more successful, for both White and Red Clover reacted better with this than to the slag. This was rather to be expected, for carbonate of lime in the field was abundantly adequate.

(2) The mixture of the same cinereals with ammonium sulphate added has not depressed the percentage of total Leguminosæ very much : on two plots the Dutch Clover has slightly increased. The percentage of weeds has been practically halved by this dressing : on one plot they have been reduced to but a quarter of their former percentage frequency. On an average, the Buttercups have been reduced most, having fallen to about a fifth of their percentages on the unmanured plots. The averages of the analyses on the plots, estimated by counting the plants per unit area, show that the falling off in buttercups is an actual reduction in the number of plants, thus with the full dressing the number of Buttercup plants per acre has been reduced to less than one-half the original number.

(3) With regard to individual grasses the following observations are of interest.

Of the valuable grasses Perennial Rye Grass has been increased most by the addition of ammonium sulphate to the cinereals. Meadow Foxtail, where present, has been greatly increased. Golden Oat Grass, Hard Fescue, Cocksfoot and the Meadow Grasses are slightly increased.

Of the less valuable grasses, Upright Brome shows a considerable decrease. Fiorin and Yorkshire Fog, however, are both increased by the addition of ammonium sulphate.

The results are, in the main, in the same direction as those obtained on the permanent manurial plots at the R. A. College: the most interesting difference being the reduction in Upright Brome produced by the full dressing; on the permanent manurial plots in the Chapel Close inorganic nitrogenous manures have not appreciably reduced this grass.

The practical conclusions from these botanical examinations are that dressing with superphosphate and potash salt, even for one year, greatly increases the percentage of Leguminosæ, and on these soils, superphosphate is generally the best form in which to use phosphates.

The addition of ammonium sulphate to cinereals has an immediate depressing effect on the weeds, especially on Buttercups, which it actually reduces in number.

The addition of ammonium sulphate tends to increase the percentage of valuable grasses.

The addition of ammonium sulphate adds to the productiveness of Fiorin and Yorkshire Fog and inferior grasses, so where these species occur in any rather considerable quantity this salt should be cautiously used. Where these grasses are *very* abundant ammonium sulphate may probably be advantageously employed, since they will not increase beyond a certain *optimum.*

MANURING EXPERIMENTS ON MANGOLDS.

(Carried out on different farms in Gloucestershire and Wiltshire, for the Sulphate of Ammonia Committee.)

These experiments were carried out on four farms, viz.:—

1 Royal Agricultural College Farm, Cirencester.
2 Church Farm at Latton, Cricklade, Wilts, by Sydney Dennis, Esq., M.R.A.C.
3 Farm at Tarlton, Cirencester, by Mr. G. H. Ractliffe.
4 Swyre Farm, Aldsworth, Northleach, by the Hon. M. H. Hicks Beach, M.P.

In most cases the arrangement of the plots, 1-110th acre each, was as below, the amount of the manures being stated per acre.

F.Y.M., 10 tons.	F.Y.M., 10 tons.	F.Y.M., 10 tons.	F.Y.M., 10 tons.	F.Y.M., 10 tons.	F.Y.M., 10 tons.
	Superphosphate, 4 cwt.	Superphosphate, 4 cwt.		Superphosphate, 4 cwt.	Superphosphate, 4 cwt.
	Kainite, 4 cwt.	Kainite, 4 cwt.		Kainite, 4 cwt.	Kainite, 4 cwt.
		Sulphate of Ammonia, 2 cwt.			Sulphate of Ammonia, 2 cwt.

At the Royal Agricultural College, Cirencester.

On Field No. 11, a strong calcareous loam with abundance of carbonate of lime. Previous cropping, 1910 seeds, 1911 mangolds dressed with farm-yard manure.

All the artificial manures were applied on May 14th, and the Mangolds drilled on May 15th, the seed being Yellow Globe, obtained from Sutton and Sons.

The Mangolds were raised, topped and cleaned the first week in November, and weighed on November 9th, with the following results :

		Tons per acre.
Plot 1.	Farm-yard manure only	18·50
Plot 2.	Farm-yard manure with superphosphate and kainite	19·47
Plot 3.	Farm-yard manure with superphosphate, kainite and sulphate of ammonia ...	21·84
Plot 4.	As Plot 1	16·68
Plot 5.	As Plot 2	17·52
Plot 6.	As Plot 3	19·78

The averages of the duplicate plots are :—

		Tons per acre.
Plots 1 and 4.	No artificials	17·59
Plots 2 and 5.	Superphosphate and kainite ...	18·49
Plots 3 and 6.	Superphosphate, kainite, and sulphate of ammonia	20·81

The cinereals alone have raised the weight of the crop by less than one ton per acre, with the addition of the sulphate of ammonia the increase is over three tons per acre.

At Mr. Sydney Dennis's Church Farm, Latton, Cricklade.

On a calcareous loam, lying on the Oxford clay, containing abundance of carbonate of lime. Western exposure. Previous cropping, 1910 barley, 1911 vetches fed off with sheep.

Farm-yard manure at the rate of 15 tons per acre was applied last autumn.

The Mangolds, Yellow Globes, were drilled on May 9th, the superphosphate and kainite applied on May 25th, and the sulphate of ammonia as a top-dressing on June 26th.

The mangolds were weighed on October 23rd and 24th. Results, calculated per acre :—

		Tons.
Plot 1.	Farm-yard manure only	12·61
Plot 2.	Ditto with superphosphate and kainite	12·97
Plot 3.	Ditto with superphosphate, kainite, and sulphate of ammonia	18·41
Plot 4.	As Plot 1	15·20
Plot 5.	As Plot 2	14·17
Plot 6.	As Plot 3	19·61

The averages of the duplicate plots are :—

		Tons.
Plots 1 and 6.	No artificials	13·90
Plots 2 and 5.	Superphosphate and kainite	13·57
Plots 3 and 6.	Superphosphate, kainite, and sulphate of ammonia	19·01

Here the cinereals alone gave no increase, whilst with the further addition of sulphate of ammonia an increase of rather more than five tons of roots was obtained.

We are indebted to Mr. W. Edmunds for help in the arrangement and management of these plots.

Mr. G. H. Ractliffe's Farm at Tarlton, Cirencester.

On East Field, a fairly stiff stone brash soil on the Oolite. Previous cropping, 1910 wheat, 1911 oats.

Early in 1912 ten loads per acre of farm-yard manure was applied. The Mangolds, Suttons' Yellow Globes, and the artificial manures were sown on May 4th. At first the prospects of the crop was very unpromising, but later on with the rains they improved, and the crop consisted of good sound roots. A good many blanks remained in the drills, however.

The Mangolds were weighed on October 31st, and the results per acre were :—

		Tons.
Plot 1.	Farm-yard manure only	12·39
Plot 2.	Ditto, with superphosphate and kainite	13·62
Plot 3.	Ditto, with superphosphate, kainite, and sulphate of ammonia	16·01
Plot 4.	As Plot 1	14·68
Plot 5.	As Plot 2	16·05
Plot 6.	As Plot 3	19·45

Taking the averages of the duplicate plots the results are :—

Plots 1 and 4.	No artificials	13·03
Plots 2 and 5.	Superphosphate and kainite	14·83
Plots 3 and 6.	Superphosphate, kainite, and sulphate of ammonia	17·73

The cinereals alone have given an increase of under two tons per acre, with the sulphate of ammonia in addition the increase is nearly 4¾ tons per acre.

At the Hon. M. H. Hicks Beach's Swyre Farm, Aldsworth.

On Cox's Ground, a rather light and brashy limestone soil over the Oolite, with north-west exposure. Previous cropping, 1910 oats, after seeds, 1911 beans. No farm-yard manure was available, but all the field had a dressing of 4 cwt. of superphosphate per acre. The Mangolds and the artificials were sown on May 17th.

The crop was a poor one throughout, the field being in poor condition, and the addition of cinereal manures alone showed very little effect during growth, with sulphate of ammonia added the growth was better, though the final results showed but a poor crop.

		Weight of roots per acre. Tons.
Plot 1.	Superphosphate only	7·8
Plot 2.	Superphosphate and kainite	7·7
Plot 3.	Superphosphate, kainite, and sulphate of ammonia	9·2
Plot 4.	As Plot 1	7·0
Plot 5.	As Plot 2	7·2
Plot 6.	As Plot 3	9·0

Mean of results.

Plots 1 and 4.	Superphosphate only	7·4
Plots 2 and 5.	Superphosphate and kainite ...	7·45
Plots 3 and 6.	Superphosphate, kainite, and sulphate of ammonia	9·1

Here we had the assistance of Mr. J. Cripps and of Mr. C. Comely, M.R.A.C., who superintended the weighings.

The botanical analyses of the grass experiments at the Royal Agricultural College, at Latton, at Dry Leaze, and at Tarlton, on 13 plots in all were made by R. G. Stapledon. Without the assistance of Mr. G. H. Corbett of the R.A.C. it would have been impossible to have conducted these analyses in the time at our disposal, and to him our special thanks are due for this and for help in weighing the produce of hay and mangolds at the various centres. Other helpers to whom thanks are due are Messrs. C. Comely, M.R.A.C., E. G. Staples, M.R.A.C., and B. Douglas.

A Meteorological Report covering the time of the experiments, compiled by Mr. M. Kershaw, B.A., from observations taken at the Royal Agricultural College, is appended.

E. KINCH.
D. TURNER.
R. G. STAPLEDON.

METEOROLOGICAL NOTES.

MAY.

The long drought of April was broken early in the month, rain falling between the 3rd and 7th. A dry spell of eight days occurred towards the end of the month, the total fall being ·36 inches above the average.

The mean temperature over the whole of the country was generally above the normal, being nearly 3°F. above at the College Station. The highest maximum of 74°F. on the 11th of the month was very high for the time of the year. There was no frost after the first day of the month.

The total amount of sunshine was 48 hours below the average for the month, the percentage of possible duration being 32, as compared to the average of 42 per cent.

JUNE.

The weather during the month was of a most disturbed character. Rain was abnormally frequent, the total fall being nearly two inches above the average. Rain fell on 20 days, the highest fall of ·69 inches occurring on the 4th.

The temperature was generally below the normal, the deficiency at the College Station being 1·4°F. below the average for the month. On only two days did the maximum reach 70°F.

The amount of bright sunshine was below the average; 36 per cent. of possible duration as compared to the average of 40 per cent.

JULY.

The rainfall during the first three weeks was not very great, but heavy rain towards the end of the month brought the total fall in excess of the average by about 1·5 inches. Rain fell on 19 days, the greatest fall being on the last day of the month (·72 inches).

Temperature was just below the normal. On the 14th and 15th the maximum readings were above 80°F.

The amount of bright sunshine was below the average, only 31 per cent. of possible duration being recorded, as compared to the average of 40 per cent.

AUGUST.

The rainfall over the country generally was in excess of the average, many places in the South of England recording at least twice as much as the normal quantity. At the College Station, the total fall (6·69 inches on 25 days) was more than 3½ inches in excess. In some parts of the country, especially the East of England, the excessive fall of rain occasioned floods of great severity, resulting in immense damage to crops.

The mean temperature for the month was 5°F. below the normal, the highest maximum recorded being 68°F., the thermometer failing to reach 60°F. on a number of days.

Bright sunshine was very deficient, the percentage of possible duration being only 23, as compared to the average of 41 per cent.

SEPTEMBER.

Very little rain fell in September until the end of the month, the total fall on the first 27 days being only ·04 inches. A fall of more than half an inch on the 29th brought the total fall up to ·81 inches, falling on six days.

Through the long drought the temperature was low, the mean being 2·6° F. below the normal. The maximum thermometer reached 60°F. on a few days only.

The duration of bright sunshine was slightly below the average, 35 per cent. of the possible duration being reached, as compared to the average of 37 per cent.

METEOROLOGICAL OBSERVATIONS AT THE R.A.C. MAY TO OCTOBER, 1912.

Week ending	Temperature.				Rainfall.			Bright Sunshine.						Temperature on Grass.		Soil Temperatures.			
	Max. F°.	Min. F°.	Mean F°.	Monthly mean, 1912, and average monthly mean (in italics)	Inches.	No. of days.	Monthly Rainfall, and average ditto (in italics)	Total in hours.	Average in hours.	Percentage of possible, and average (in italics).		Monthly total, and averages (in italics). hours.	per-centage	No. of nights frost on grass.	Minimum temp. on grass.	Mean for week at depth 1 ft.	Monthly mean. 1 ft.	Mean for week at depth 4 ft.	Monthly mean. 4 ft.
May 4	65	31	47·6	May	·12	2	May	33·6	42·0	33	*41*	May		2	28	51·2	May	48·8	May
11	74	45	57·4	53·6	·32	3	2·44	25·2	44·1	24	*42*	156	32	—	46	52·8		49·5	
18	68	40	52·8		·43	4		41·3	45·5	38	*42*			—	40	54·4	53·7	51·3	50·9
25	63	39	51·0	*[50·7]*	1·13	4	*[2·08]*	37·8	46·9	34	*42*	*[204]*	*[42]*	—	37	54·2		51·8	
June 1	68	36	52·1	June	·80	2	June	49·0	47·6	44	*42*	June		—	37	55·6	June	52·3	June
8	64	38	51·8	55·6	1·46	5	4·09	26·6	46·9	23	*41*	177	36	—	39	55·1		53·0	
15	67	43	54·3		·65	4		53·9	46·2	47	*40*			—	42	56·7	56·8	53·6	54·0
22	75	47	57·7		·34	2		48·3	45·5	42	*39*			—	45	57·2		54·3	
29	71	47	57·1	*[57·0]*	1·27	6	*[2·39]*	44·8	44·8	39	*39*	*[195]*	*[40]*	—	46	58·1		55·0	
July 6	70	44	55·8	July	·50	5	July	21·0	44·8	18	*39*	July		—	42	57·5	July	55·3	July
13	78	40	60·6	60·1	·09	4	3·40	39·2	44·8	35	*40*	151	31	—	40	60·1		55·7	
20	84	44	62·9		·29	2		61·6	44·8	55	*40*			—	39	63·0	60·4	57·6	56·9
27	70	50	60·2	*[60·3]*	1·18	5	*[2·85]*	22·4	44·8	21	*41*	*[199]*	*[40]*	—	49	61·3		58·1	
Aug. 3	63	42	54·1	Aug.	1·98	5	Aug.	27·3	42·7	26	*42*	Aug.		—	38	58·7	Aug.	57·9	Aug.
10	67	45	55·0	54·1	1·29	7	6·69	25·9	42·7	25	*41*	101	23	—	45	57·6		57·1	
17	61	40	51·5		·92	5		7·0	41·3	7	*41*			—	40	56·3	56·9	56·5	56·1
24	65	41	55·0		1·72	7		18·2	41·3	18	*40*			—	40	56·4		56·0	
31	65	37	53·7	*[59·0]*	2·18	5	*[3·15]*	30·1	37·8	31	*39*	*[182]*	*[41]*	—	38	56·7		56·0	
Sept. 7	62	42	52·2	Sept.	·02	1	Sept.	31·5	35·7	34	*39*	Sept.		—	39	55·8	Sept.	56·0	Sept.
14	65	39	50·2	51·5	·02	2	·81	23·1	34·3	26	*38*	130	35	—	37	54·1		55·2	
21	64	39	52·2		—	—		30·1	31·5	35	*36*			—	38	54·1	53·8	54·9	55·0
28	61	36	48·6	*[55·1]*	·16	1	*[2·69]*	39·2	29·4	47	*35*	*[139]*	*[37]*	—	33	51·9		54·1	
Oct. 5	60	26	46·9	Oct.	1·04	3	Oct.	34·3	27·3	43	*34*	Oct.		2	25	50·9	Oct.	53·2	Oct.
12	59	29	44·6	44·6	·01	1	3·77	41·3	24·5	54	*32*	108	33	4	28	48·1		51·8	
19	60	30	46·0		·22	3		22·4	22·4	31	*31*			1	29	48·9	48·5	51·1	51·2
26	56	29	40·8	*[47·8]*	1·42	6	*[3·27]*	7·0	20·3	10	*29*	*[100]*	*[31]*	3	30	46·8		50·5	

OCTOBER.

The rainfall was about half-an-inch above the average, but most of it fell during the second half of the month. From the 2nd to the 15th only ·01 inches were measured.

The mean temperature was again below the normal, the deficiency being more than 3°F. On several days the maximum reading fell below 50°F. The number of ground frosts occurred on ten days, the minimum grass reading being 25°F. on the 5th.

The amount of bright sunshine was above the average, this being the only month since April which showed an excess. The percentage of possible duration was 33, as compared to the average of 31 per cent.

M. KERSHAW.

R.A.C. LITERARY AND DEBATING SOCIETY'S DRAMATIC ENTERTAINMENT.

This annual entertainment was given on the evening of December 12th, in the College Hall, which was filled with an audience representative of the town and district. The play produced was an ambitious effort, but justified by its success; it was "Tantalising Tommy," a Comedy in four Acts, by Paul Gavault and Michael Morton, which had a long run at The Playhouse. The *Dramatis Personæ* were—

James Cottenham (Clerk in Colonial Office)	R. H. COLES
Harry Killick (an Artist)	F. C. PICKERING
Thomas H. Pepper (a Merchant Prince)	H. D. ELKINGTON
Eustace Tathem (J. Cottenham's Chief)	C. L. WHITE
Lord Enderby (Tommy's Fiancee)	L. A. ECKSTEIN
Jennings (Mr. Pepper's Chauffeur)	E. V. COPE
Jack Mason Frank Ricketts } Clerks in Colonial Office	G. BARCLAY A. C. TOR
Simpson (Colonial Office Messenger)	E. B. WILLIAMSON
Elsie Tathem (J. Cottenham's Fiancee)	Miss E. FYFE-MILLAR
Bertha (Maid of all work)	Miss PHYLLIS COTGRAVE
Tommy (Mr. Pepper's Daughter)	Miss AINSWORTH-DAVIS

ACTS I. AND II.

Mr. James Cottenham's Cottage in the New Forest.

15 *Minutes' Interval.*

ACT III.

A Room in the Colonial Office—a week later.

ACT IV.

Harry Killick's Studio.

It is needless to say that but for the co-operation of Miss Ainsworth-Davis and her friends the production of such a piece would have been impossible. We need not give the plot of the piece, which is doubtless known to most of our readers. The title *rôle*, the daughter of a Merchant Prince who (the daughter) appeared in the place of a much desired son and was called "Tommy" by her indulgent father, was of course taken by Miss Davis, and the part could scarcely have been improved on : she gave a life-like representation of the petted "Tommy" who invariably had her own way and generally deserved it for her masterful insistence and versatility : she was naturally the life of the piece. Miss Phyllis Cotgrave as the cheery and impressionable maid of all work, "Bertha," was an able second, and we confidently affirm that she is never likely to be out of a place. Miss E. Fyfe-Millar, in the subordinate part of Mr. J. Cottenham's fiancee, had less to do but did it well.

Of the male characters Mr. H. D. Elkington as "Tommy's" father was an excellent get-up, and he sustained the character of the indulgent father to a tantalising daughter in a thoroughly satisfactory way. The difficult part of James Cottenham, engaged to Elsie Tathem, the daughter of his chief in the Colonial Office, was very well taken by R. H. Coles, who had obviously taken much pains and most admirably showed necessary self restraint under the very trying circumstances in which he sometimes found himself through the vagaries of Tommy, sometimes enhanced by the actions of his friend Harry Killick. This latter part, that of a Bohemian artist, was realistically taken by F. C. Pickering. C. L. White made an admirable representation of a tape-bound Government Official, who was also the father of Elsie Tathem. E. V. Cope was a smart Chauffeur who knew his business well ; as did J. B. Williamson as a Colonial Office Messenger. The minor parts of the Clerks in the Colonial Office were effectively played by those who made them realistic ; nor must we forget the part of Lord Enderby by L. A. Eckstein who, we think, made the part of a not very insistent lover as the authors intended it.

The new scenery made a great demand on the stage carpenters and property makers, who were Prof. D. Turner and Messrs. A. H. R. Phillips, T. B. Cook, A. R. F. Murdock, C. Byron-Turner, and J. M. Rayden, whose efforts were much appreciated and admired.

The play was produced under the management of Professor A. Duncan, who gave much time and trouble to its production, and was probably well satisfied with the results.

Messrs. Paish's band acted as Orchestra.

After a very successful performance, one of the most ambitious and one of the best ever produced on this stage, the visitors were entertained and refreshed by Mrs. Ainsworth-Davis.

THE WEIGHT OF CALVES.

Following a discussion as to the average weight of a newly-born calf, it was decided to keep a careful record of a number of cows, so as to collect some reliable information on the subject. Careful records of nineteen Shorthorn cows were taken, and the results are given in the following tables :—

The records of the bull calves appear in Table A.

TABLE A. BULL CALVES.

Age of Cow in years.	Gestation Period in days.	Weight of Calf at Birth in Pounds.
8	286	68
5	283	83
4	282	84
9	280	58
6	296	115
5	297	112
7	292	98
8	289	98
4	288	77
7	296	114
6	289	77
Average, 6·27	288·91	89·45

The records of the heifer calves appear in Table B.

TABLE B. HEIFER CALVES.

Age of Cow in years.	Gestation Period in days.	Weight of Calf at Birth in pounds.
7	280	80
5	287	84
5	279	76
5	274	77
4	288	80
7	282	84
5	293	105
8	287	74
Average, 5·75	283·75	82·5

The general belief that bull calves are carried longer than heifer calves seems to be upheld by these trials, as it will be noticed that the average period of gestation in Table A is practically 289 days, against 284 in Table B. The longest period in Table A is 297 days, and the shortest period is 280 days. The longest period in Table B is 293 days, and the shortest period is 274 days.

It is noticeable that the longer the period, the heavier is the calf in each case. The average weight of the bull calves, 89·45 lbs., exceeds that of the heifer calves, 82·5 lbs., by about 7 lbs.

It is also to be noted that three of the bull calves exceeded a cwt. when born, whilst the heaviest weight of a heifer calf was 105 lbs.

Other information gathered from these trials is that the heavier calves are produced from cows in their prime, that is ranging from five to seven years of age, after this age the calves appear to become smaller at birth. It would have been very interesting and instructive if the calves from this trial had been reared and a careful record kept of the weekly increase in live weight to see if the calves which were the heavier at birth continued to grow at a greater rate than those which were lighter at birth. As if such proved to be the case it would be certainly to the benefit of the farmer if only calves from cows in their prime were reared and the remainder either fattened for veal or sold.

The records were taken from cows of the ordinary dairy Shorthorn type, and the calves were sired by a two-year-old Shorthorn bull.

No heifers with first calf were included, the ages of the cows in the test varied from four to nine years.

From the results obtained in this test it is safe to take an average of 285 days as the period of gestation, and the average weight of a Shorthorn calf at birth somewhere about three-quarters of a cwt. (84 lbs.). CHARLES D. STEWART.

WILLIAM JAMES MEMORIAL FUND.

The subscribers to this fund number 134, headed by the Royal Agricultural College and including past and present Members of the Staff and Students, the great majority being M's.R.A.C. The dates at which the subscribers were at the College vary from 1863 to the present date, and a large number in sending their subscriptions testify to the benefits they received at the hands of "Tom" or William James, and to his great patience and resource.

The total sum collected was £289 12s. 6d.; a typewriter has been purchased for one of the daughters, the rent of a house paid, and the expenses of printing and postage; the remainder is vested, for the benefit of the family, in the following trustees, Professor J. R. Ainsworth-Davis, E. B. Haygarth, Esq., H. Blaauw, Esq., M.R.A.C., and Professor Edward Kinch, R.A.C., Treasurer.

OBITUARY.

Dr. Ramsay Heatley Traquair, M.D., LL.D. (Edin.), F.R.S., died at Colington, near Edinburgh, last month. He was born at Rhynd, Perthshire, in 1840, and educated at Edinburgh University. Dr. Traquair was Professor of Natural History at the R. A. College in 1866 and 1867. In the latter year he became Professor of Zoology in the Royal College of Science, Dublin, and six years later he was appointed keeper of the Natural History Collections in the Museum of Science and Art, Edinburgh, now known as the Royal Scottish Museum. This post he held till his retirement six years ago. He was widely known and esteemed as an ichthyologist and palæontologist and succeeded in gathering a collection of fossil fishes for his museum which is second only to that in the British Museum. In 1881 he was elected a Fellow of the Royal Society, and in 1907 he received a Royal Medal of the Royal Society for his investigations relating to fossil fishes.

The death is reported, on November 23rd, at Cheltenham, of Farquhar Forbes-Robertson, Esq. (R.A.C. 1856-58), formerly farming in Ayrshire, but for many years resident at Langton Lodge, Charlton Kings, Cheltenham, aged 74.

We regret to record the death of Mr. Horatio Chancellor (R.A.C. 1852-1854), at his home, Chessington Hall, Surrey, on August 25th, in his 75th year. He was an advanced agriculturist and skilful farmer, and took a constant interest in the R.A.C. and the Old Students' Club. He was a student of Fanny Burney's works and times, and in latter years made a hobby of rock plants, of which he had a valuable collection.

FARM NOTES.

The experiments carried out during the summer on Field No. 11 include :—

(a) A manurial trial on mangolds : the results of this trial are published on a former page.

(b) A variety trial with potatoes : the following sorts being experimented with, viz. :—Midlothian Early, Duke of York, Sir John Llewellyn, Epicure, King Edward, Duchess of Cornwall, Factor, Dalmeny Beauty, Scottish Triumph, and Up-to-Date.

(c) An experiment with the spraying of potatoes as a preventive to the blight (*Phytophthora infestans*).

A full report of these potato trials will be published in the next number of the *Gazette*.

On the 7th instant Mr. W. Cousins, on behalf of Messrs. Curtis and Harvey gave a demonstration, in the arable part of Field No. 11, of the explosion of " Cheddite " cartridges under the soil, with a view to subsoiling and assisting in drainage. The cartridges, 4oz., were placed ten feet from each other in rows nine feet apart, and buried in a hole made with a crowbar 2½ to 3 feet deep, where the rock was reached. The cartridges were exploded with a fuse ; the explosions to some extent shattered the underlying rock, but it brought a good deal of subsoil, yellowish clay, to the surface which was not wished for and is detrimental : it was desired only to shake the subsoil, not to deposit it on the top. Perhaps with smaller charges the results would have been better. The total cost is rather over £5 per acre. As a preparation for planting rather large trees the process may prove useful.

At the Hurst Park Meeting in August, Mr. Russell Swanwick's Equanimity won the Lennox Plate, with W. Huxley up, carrying 7st. 12lbs. The Duke of Portland's Honastir was second. Equanimity is a chestnut daughter of Bachelor's Button and Golden Dawn, a half sister to All Gold and Diamond Stud, her dam being Dame d'Or by Bend Or from Dame Masham by Galliard. Equanimity also won the Durham Stakes at Newmarket on November 1st by two lengths from Mr. L. de Rothschild's Lorenzo.

OFFICERS' TRAINING CORPS.

The College contingent took part in the annual training in August at Windmill Hill Camp, Salisbury Plain, and despite the unusual severity of the weather, accomplished some useful work.

During this term Major W. L. Loring retires from the Adjutancy, his period of service having expired, and the duties of Adjutant have been taken on by Major Christie, Royal Warwickshire Regiment, who is resident in Cirencester.

The following promotions have been made this term: To be Corporal, Cadet Williamson ; to be Lance-Corporal, Cadets Corbett, Hissy, and Rayden.

The contingent will be under the command of Lieutenant M. Kershaw, Special Reserve, 1st Gloucestershire Regiment, until arrangements can be made for the appointment of an officer belonging to the Corps.

It is a pleasure to note that the proportion of men who have passed through the Corps and taken Commissions either in the Reserve of Officers or in the Territorial Force is very high, and it is to be hoped that the inducements offered by the War Office to such candidates will be accepted to a still greater extent. The Corps may feel proud of the position it holds in this respect, and it would be the greatest pity if it fell through owing to lack of support. It is to be hoped that a number of recruits will come forward to join the Corps next term, in order to bring the numbers up to strength. The training which members of the Corps go through is of inestimable value, and we hope this will be more fully realised by students, and that we shall soon see the contingent brought up to its full strength.

CHLORINE IN RAIN WATER.

During the six months ending September 30th rain fell on 87 days, making a total of 17·59 inches, it contained a mean of chlorides equivalent to ·165 grains of sodium chloride per gallon, this being equal to a deposit of 9·33 lbs. of common salt per acre.

For the twelve months ending at the same date the rainfall was 40·93 inches, falling on 214 days, and the chlorides present equal to 43·08 lbs. of common salt per acre. E. K.

THE R.A.C. SUMMER SCHOOL OF AGRICULTURE.

The R.A.C. Summer School of Agriculture held its session in August last; and the 18 students, mostly secondary teachers, who attended from ten counties, expressed their warm approval of the instruction provided, also their hearty thanks for the use of a room and other concessions at the Bingham Library. The counties represented were Wilts (5), Somerset (3), Bucks (1), Lancashire (1), Suffolk (1), Lincolnshire (1), Cambridgeshire (1), Monmouthshire (1), Sussex (1), and Shropshire (1). Most of the teachers held special bursaries from their county authorities. The teachers and subjects were as follows: *Agriculture*, Professor Drysdale Turner, S.E.A.C., P.A.S.I.; *Dairying and Poultry*, Mr. C. D. Stewart, N.D.D.; *Agricultural Chemistry*, Mr. H. D. Elkington, B.Sc., A.I.C.; *Surveying*, Mr. J. P. C. Done, P.A.S.I.; *Entomology*, Professor Ainsworth-Davis, M.A.; *Horticulture*, Mr. T. Sharp (Instructor for Wiltshire); *Bee-keeping*, Mr. J. W. Watkins; *Smith Work*, Sergeant W. G. Thorntou; *Practical Carpentry*, Mr. C. Cox.

FORESTRY DEPARTMENT.

The R.A.C. is recognised as the centre for advisory work in Forestry in the counties of Cornwall, Devon, Somerset, Gloucestershire, Wiltshire, Monmouthshire, Herefordshire, Worcestershire, and Glamorganshire, and receives a grant in aid therefor from the Development Fund, through the Board of Agriculture.

Professor H. A. Pritchard, F.S.I., has been appointed Technical Adviser, and Mr. A. D. Hopkinson, B.Sc., Lecturer in Forest Mycology and Forestry.

BOTANICAL DEPARTMENT.

Professor R. G. Stapledon, M.A., has been appointed to a post of Research Botanist, under the Board of Agriculture, he being quartered at University College, Aberystwyth. His work will be mainly devoted to the Ecology of plants and specially in grass lands. Mr. Stapledon has already done good work in this direction in this neighbourhood, and from the College, and we are very sorry to lose his direct services to the R.A.C. in this direction. Some of the results of his keenness and abilities have been published in our *Gazette*; and some appear in the current part.

Mr. C. B. Saunders, B.Sc. (Lond.), has been appointed successor to Mr. Stapledon at the R.A.C.

SURVEYORS' INSTITUTION.

Mr. Ram Gopal, M.R.A.C., now of the Punjab Agricultural College, Lyallpur, has been elected a Professional Associate.

R.A.C. OLD STUDENTS' CLUB.

The annual dinner of this Club takes place on December 11th. Mr. Christopher H. Turnor in the chair; we will give an account of it in our next issue.

DIPLOMA EXAMINATION.

At the examination terminating in July, 1912, the following gentlemen obtained the Diploma of Membership with Honours: Harold Edwin Hippisley, Wells, Somerset; Richard Watson Pennington, Eastbourne; Ali Mustafa Tabbara, Beirut; Abdel Wahid Fahmy, Cairo; Ali Selim Salam, Beirut, Syria; John Anthony Arnold Forster, Bassett Down, Wroughton; Henry Francis Lascelles, Midhurst, Sussex; Robert Horsfall, Melton Constable; and Don Marescotti Ruspoli, Paris.

Hippisley obtained the Haygarth Gold Medal, and Pennington the Harker Silver Medal.

William George Barnes, Banbury, Oxon, reached aggregate pass marks, but has still to pass in one subject.

The Certificate of Associateship was gained by Joseph Olivares y Bruguera, Marquis de Murrieta, Madrid; Bama Shankar, India; and Yousef Sabit, Cairo.

The external examiners were in Practical Agriculture, Professor W. McCracken; in Agricultural Chemistry, Dr. J. A. Voelcker; in Forestry and Estate Management, Mr. Leslie S. Wood, F.S.I.; in Surveying, Professor H. Robinson, M.I.C.E.; in Veterinary Science, Professor W. Hunting, F.R.C.V.S.; and in Botany, Professor G. S. West, D.Sc.

SCHOLARSHIPS.

The First Scholarship last term was awarded to Harold Edwin Hippisley; the Second to Richard Basil Comely; and the Third to Richard Watson Pennington.

LAWN TENNIS.

At the end of last term the College won its matches (two) against the town.

Messrs. A. de C. C. Meysey-Thompson and J. White received their colours.

CROSS COUNTRY RACE.

This annual event took place on Tuesday, December 3rd, the course of about five miles being twice round the College Farm. There were eight starters, of whom five completed the first round and four finished, in the same order as in the first round. First G. de

Trafford, second R. H. Coles, third T. Drake, fourth E. Schall. At the end of the first round de Trafford was about 50 yards ahead (time 16½ minutes), and Coles 100 yards ahead of the third man. The finish was a very close one, about 8 yards only separating the first two men, Coles not being able to quite reach de Trafford, though gaining 25 yards in the straight run in. 400 yards separated the second and third. The race took 34½ minutes ; a very creditable time considering the hardness of the going. Also ran, Pepper, Cochrane, Leete, and Eckstein. Prof. Kinch acted as starter, and with Prof. Pritchard as judges, Mr. Corbin kindly acting as] arbitrator on horseback.

R.A.C. BEAGLES.

These hounds have shown excellent sport this season under the able mastership of Mr. Pepper. They have hunted two days a week, and have killed seven hares up to date. This is a falling off in number from last year, but can be accounted for by lack of scent, and by the increasing quantity of hares in most parts of the country hunted. Nothing like a blank day has occurred, long hunts generally being shown. Enthusiasm for this pack seems as strong as ever, both in and outside the College. The hospitality shown by farmers over whose land we hunt is as whole-hearted as ever, and an excellent feeling prevails between them and the College. The subscriptions for the current term have been fully up to expectations and it is hoped that gentlemen will continue to offer their patronage next term if this exceedingly sporting pack is to continue. Mr. Pepper has been most ably seconded by his whips. Messrs. Schall and R. de Trafford, and the pack have justified the care and selection bestowed upon them by Mr. Pepper.

FOOTBALL.

RUGBY.

THE TEAM.

O. H. **Lee Lum** (Captain).—Has played well throughout the season and may be congratulated on having formed a team out of very little substance.

R. H. **Coles** (Secretary).—An energetic secretary. Led the forwards with great success. A hard working forward both in the scrum and in the loose. One of the few who knows what to do in a line out. A good tackle.

M. **Kershaw**.—One of the best outside. Has helped the forwards a great deal by his long punting. Good both in attack and defence. Has dropped a few goals for the College.

E. B. **Williamson**.—A hard-working forward, but rather on the small side. One of the best tacklers amongst the forwards. Quite useful as a three-quarter.

A. **Wardlaw**.—Quite a good forward. Uses his feet with advantage in the open. Good both in the scrum and in the line out. A useful tackler.

A. **Apostolides**.—A hard working and energetic forward, and is always on the ball.

H. **Leete.**—Quite a good three-quarter, but his place is on the wing. His speed and knowledge of the game have enabled him to score many tries. A safe tackler and good kick.

G. M. L. **Goodall.**—A good hard-working forward, useful in the scrum and in the loose.

A. S. **Patten.**—A hard-working forward, but rather on the small side. Has played in almost every place on the field. Saves well and tackles his man.

A. E. **Morris-Eyton.**—Quite a useful back, but rather slow. Kicks well and tackles his man very hard. One of few players who falls on the ball.

H. G. **Corbett.**—Quite a good wing. Has picked up the game very quickly. Will be very useful next season.

G. J. **Mowat.**—A hard-working forward with a lot of weight. Good in the line out and in the loose.

C. L. **White.**—Has played quite well all through the season. Very quick in getting the ball away from the scrum. A good kick, but weak in tackling.

L. A. **Eckstein.**—A hard-working forward, but with more knowledge of the game will be very useful.

R. A. **Ralli.**—Has only taken up the game this season. Will be quite useful next season.

The following gentlemen have also represented the College :—F. C. Pickering, W. Pepper, D. Phillips, R. F. Murdock, S. Floyd, K. Johnson, K. W. Brewster, G. R. Trusted, G. de Coundouroff, Hornby and L. Saunders.

R.A.C. v. **Cheltenham College.**—This match was played on the Cheltenham ground on Wednesday, October 16th, and a good game resulted in a win for Cheltenham by 26 points to 3. It was the first game of the R.A.C., and naturally there was a lack of understanding among the forwards and the three-quarters also were not used to playing with each other, so the ball went astray continually. The team showed fair form and should train on into a good side before long. Corbett scored for the College, the opposing back being caught napping. Lee Lum, Morris Eyton, Kershaw, Coles, and Williamson played well. The following represented the College :—Morris Eyton, back ; Mowat, Leete, Kershaw, Corbett, three-quarters ; Lee Lum and White, halves ; Coles, Williamson, Wardlaw, Apostolides, Goodall, Murdock, Patten, and Brewster, forwards.

R.A.C. v. **Gloucester Old Boys.**—This match was played at the College on Saturday, October 19th, and resulted in a win for the visitors by 9 points to nil. It was a rough game throughout, considerable feeling being shown by the Gloucester team, whose tactics were noticed continually by the referee. The College defended well and showed slight improvement, but the three-quarters must learn to run straight and not crowd the wings on to the touch line before passing. The following represented the College :—Morris Eyton, back ; Ralli, Leete, Kershaw, and Eckstein, three-quarters ; Lee Lum and White, halves ; Coles, Wardlaw, Williamson, Apostolides, Goodall, Murdock, Patten, and Phillips, forwards.

R.A.C. v. **Cheltenham Grammar School.**—This match was played at Cheltenham on Wednesday, October 23rd, and resulted in a win for the College by three tries to a goal. The Grammar School scored first, but that roused the R.A.C., and they scored three times before the whistle blew. It was a forward game throughout, and the ball was very difficult to hold. Leete (twice) and Apostolides scored for the College. All the forwards played well, also Pickering at back. The following represented the College :—F. C. Pickering, back ; Leete, Kershaw, White, and Murdock, three-quarters ; Lee Lum and Patten, halves ; Coles, Wardlaw, Williamson, Apostolides, Goodall, Eckstein, Mowat, and Phillips, forwards.

R.A.C. v. **Monkton Combe School.**—Played away on October 26th. Owing to lateness of trains the game had to be considerably shortened. The ground was in a very wet condition, and the ball was very heavy throughout. The School forwards settled down more quickly than those of the College, and frequently got the ball out to their backs, who, however, were too well marked to score. Play in mid-field was general during the first half, but Apostolides getting away took the ball nearly to the school line, and transferring to Leete allowed the latter to score well out ; no goal resulted. A break away by Corbett seemed certain to produce results, but the home back was safe; half-time score, 3—0. During the second half play was chiefly confined to the forwards, but towards the end Lum obtaining made a lot of ground, and passed to Leete, who kicked over the back's head and out-distancing him scored between the posts for Goodall to convert. Soon after this the whistle went, and the College were the victors by 8—0.

R.A.C. v. 1st Gloucester Regiment.—Played on the Gloucesters' ground at Portsmouth on Wednesday, October 30th, and resulted in a win for the home team by 2 goals 2 drop goals and 4 tries, 30 points, to nil. The College played a plucky game all round, and had more of the game than the score indicates. The Gloucesters outweighed the College in the scrum, which made all the difference to the game, the College seldom getting the ball. For the College, Eyton, White, Kershaw, Lee Lum, Patton, and all the forwards played with marked distinction, Coles and Apostolides particularly being great in the loose. The following represented the R.A.C.:—Morris Eyton, back; Leete, Kershaw, White, Murdock, three-quarters; Patten and Lee Lum, halves; Coles, Williamson, Apostolides, Wardlaw, Goodall, Mowat, Eckstein, and Phillips, forwards.

R.A.C. v. Swindon R.F.C.—This match was played at the College on Saturday, November 2nd, and a good game resulted in a win for the College by two goals and five tries to nil. The College showed great improvement all round, and the inclusion of Pickering at centre three-quarters was a success. The forwards played well, and the passing among the threes was clever and showed greater accuracy than before. The tries were scored by Pickering (2), Leete (2), Lee Lum, Coles, and Williamson once; Kershaw, who played a strong game, kicking two goals. The following represented the College:—Morris Eyton, back; Leete, Kershaw, Pickering, and Corbett, three-quarters; Lee Lum and White, halves; Coles, Williamson, Apostolides, Wardlaw, Patten, Murdock, Goodall, and Eckstein, forwards.

R.A.C. v. Gloucester Thursday.—This match was played at the College on Thursday, November 7th, and a grand game resulted in a win for the College by a dropped goal, a penalty goal and a try to a goal and a try, 10 points to 8. It was a game full of sensation, the College, although weakened by the absence of Coles and Morris Eyton played at the top of their form. Kershaw dropped a beautiful goal and also kicked a goal from a penalty, and in the last few seconds of the game a grand piece of opportunism between Lee Lum and Leete enabled the latter with a great run to score the winning point. The College played well to a man, Kershaw's kicking and Patten's saving being particularly noticeable. The College were represented by:—Patten, back; Leete, Kershaw, Pickering, and Pepper, three-quarters; Lee Lum and White, halves; Williamson, Wardlaw, Apostolides, Goodall, Murdock, Mowat, Eckstein, and Johnson, forwards.

R.A.C. v. Stroud.—Played at Stroud on Saturday, 9th November. After a very scrambly game Stroud won by 28 points to nil. The College forwards played hard, but were outweighed and hardly got possession of the ball in the scrum.

R.A.C. v. Gloucester Franciscans.—This match was played on the College ground on Thursday, November 14th, in the presence of a large number of spectators. The visitors pressed at the start, and soon scored as a result of a forward rush. The College played up better after this, the forwards playing well together. There was no further score in the first half, the visitors leading by a try to nil. In the second half the game was keenly contested, the visitors' passing being very good, but the College defence was too sound. Towards the end Lee Lum broke away from the blind side of the scrum, and cleverly dodging several opponents, scored after a long run. The whistle sounded shortly afterwards, a well-contested game ending in a draw of one try each. The particular feature of the game was the strenuous play of the College forwards and the good defence of both sides. R.A.C. team:—Back, Morris Eyton; three-quarters, Pepper, Kershaw, Leete, and Patten; halves, Lee Lum and White; forwards, Coles, Williamson, Wardlaw, Apostolides, Goodall, Mowat, Eckstein, and Murdock.

R.A.C. v. Gloucester Old Boys.—Played at Gloucester on November 16. It was a hard game throughout. The Gloucester Old Boys kicked off and quickly got the ball into our 25, and continued to press for about ten minutes, when they scored between the posts as a result of a five yards scrum; the try was converted. The game then became more even, leaving the score at half-time

5 to nil in their favour. The second half was very open. They, however, scored twice, converting once. Leete scored a try for us by a very fine piece of dribbling from our 25. For the College, Lee Lum, Leete, and Apostolides played well.

R.A.C. v. SOUTH-EASTERN AGRICULTURAL COLLEGE (WYE).—This annual match took place on November 20th at Catford Bridge. Last year's meeting, the first of the series, resulted in an overwhelming victory for Wye, who also won this year's match, though by a greatly reduced margin, the score being a goal, a dropped goal and four tries to two tries. Wye kicked off and after some loose play the R.A.C. pressed, and Kershaw, punting high, enabled Leete, by hard following up, to score. The try was not converted. After this reverse, Wye kept the R.A.C defence busy, and it was seen that Wye possessed a better pack, at this stage, than the R.A.C. Their pushing and heeling was far superior and it was only by good tackling on the part of the R.A.C. defence that the score was not larger. However, Wye eventually scored. Johnson—the scrum half—obtaining possession of the ball, got over between the posts. The try was converted. From now until half-time Wye continued to have the upper hand. Leete was penalised for off-side, and from the kick a goal resulted. Gregory obtained two tries, and Bramwall dropped a neat goal. At half-time the score was—Wye 15 points, R.A.C. 3 points. On resuming, the R.A.C. were seen to advantage. There was a marked improvement in the heeling and following up of the R.A.C. forwards. The result of this was a well contested half, in which the R.A.C. were slightly superior. Leete, who had been conspicuous the whole of the game, met with an accident and had to retire. Williamson, who had played well in the loose, took his place. Wye scored two tries in quick succession. Neither was converted. Lee Lum was prominent in a fine individual effort, running from mid-field to near the goal line before he was brought down. Coles, after a good run, cross kicked, and Leggatt misfielding, Corbett scored. Soon after, no-side was blown, with Apostolides, who had played well throughout, still on the ball. R.A.C. team :—Back, Morris Eyton ; three-quarters, Corbett, Leete, Kershaw, and Pepper ; halves, Lee Lum (capt.) and White ; forwards, Coles, Williamson, Wardlaw, Apostolides, Goodall, Mowat, Patten, and Eckstein.

R.A.C. v. MONKTON COMBE SCHOOL.—Played on the home ground on Saturday, November 23rd, and resulted in a win for the College by 15 points to nil. The game was exceptionally fast, and during the first half the Monkton side were on the defensive. The Monkton Combe back fumbling the ball on two separate occasions allowed Corbett and Kershaw to get over the line. Shortly afterwards Leete broke away and scored between the posts. Kershaw succeeded in converting the three tries. In the second half the Monkton Combe side made several rushes, but were unable to break through the College defence. Lee Lum breaking away at top speed, passed to de Coundouroff, who failed to intercept the pass, thereby losing a certain try for the College. Although the light in the second half was very bad, it was universally agreed that the game was one of the best matches played this year on the home ground. The following represented the College :—Patten ; M. Kershaw, H. Leete, G. H. Corbett, and de Coundouroff ; O. H. Lee Lum (captain) and C. L. White ; R. H. Coles, E. B. Williamson, A. Wardlaw, G. A. Apostolides, G. M. Goodall, G. T. Mowat, L. A. Eckstein, and K. W. Brewster.

R.A.C. v. BRISTOL UNIVERSITY.—Played at Bristol on November 30th. Winning the toss, the College elected to play down the hill, with the sun behind them ; the ground was decidedly hard, and the game proved to be very fast. The University team was the superior in every department ; the College team being weakened by the absence of Wardlaw, Mowat, and Eyton. The University kicked off, and play remained in the College half for practically the whole of the first half ; the College forwards were unable to withstand the weight of their opponents. In the second half the Bristol backs were seen to great advantage and entirely outplayed those of the College ; towards the end of the game, however, a fine opening was made for Corbett, who, racing along the line, scored at the corner flag, Kershaw's attempt at goal just falling short. Soon after this the whistle went for no-side, leaving Bristol the victors by 47—3.

R.A.C. v. CHELTENHAM GRAMMAR SCHOOL.—The return match was played here on Wednesday, December 4th. Lee Lum again being successful in the toss, the College commenced playing towards home. Play commenced fairly evenly, but from a scrum on the half-way line, White got the ball away well, and by some neat passing among the three-quarters Kershaw was able to score on the right wing, but failed to convert for himself. After the drop the School took the ball down to the half-way line, but Kershaw gathering the ball made a good run and kicking over the back's head, Coles following up hard was able to touch it down on the right wing. Leete failed to convert. Soon after the 25, Leete receiving the ball from Williamson, made a strong run, and kicking over the back's head, was able to score out on the left wing. No goal resulted. The School played strongly after this, but Kershaw checking, kicked across the left wing, and Ralli, after a fine dribble from half way, scored between the posts. Coles converted. After half-time Leete received a long pass from Williamson, and punting over the three-quarter, owing to clumsiness on the part of their back scored between the posts for Coles to convert. This was followed almost immediately by another try by Leete, who picked up the ball from a long pass along the ground. Coles' kick was unlucky, as it hit the cross-bar and came back. After the drop out, the College again pressed, and heeling from a scrum, Leete scored on the right wing, having run round the scrum. No goal resulted. After this the School rallied considerably, and scored twice in quick succession, the first resulting in a goal. Since there was no further score, the College won by 25—8.

Bristol University v. R.A.C.—Played at home on December 7th. The visitors brought a slightly weaker side than they had the previous week, and the College had a full side except Wardlaw. The weather conditions were wretched, a fine rain falling throughout, making accurate handling very difficult. The visitors on kicking off rushed the ball into the College 25, but Kershaw relieved with a very fine kick into touch; soon after, however, the Bristol forwards again came with a rush, and got over the line; the try was not converted. Soon after this the College forwards worked the ball down the field almost to the visitors' line, but failed to score. A clever piece of work by the Bristol three-quarters allowed Page to score; before half-time Bristol forwards again scored; neither of these tries was converted; the score at half time was 9—0. In the second half play was much more even, the forwards on both sides doing most of the work. Play oscillated between the two twenty-fives until a Bristol outside completely beat our defence, and scored between the posts, and the try was converted. Soon after this the College had the misfortune to lose Leete, who retired with slight concussion. Play was stopped a few minutes later owing to the failing light, leaving Bristol victorious by 14—0. The College forwards, by far the lighter pack, were frequently beaten in the scrums, but showed themselves quite equal to the visitors in the loose.

CRICKET, 1912.

Batting Averages.

	No. of Innings.	Runs.	Most in an Innings.	Times not out.	Average.
H. E. Hippisley	12	351	94	1	31·81
M. Kershaw	12	329	67	—	27·41
W. Pepper	7	156	45	—	22·28
R. M. Heywood	11	193	44	—	17·54
Hon. G. S. Bailey	11	124	45	—	11·27
F. C. Pickering	11	66	25	2	7·33
H. Lascelles	10	58	16	—	5·80
H. A. Pritchard	4	16	11	1	5·33
C. L. White	11	40	8	1	4·00
O. H. Lee Lum	13	56	14	1	4·66

Bowling.

	No. of Wickets.
M. Kershaw	58
O. H. Lee Lum	19
D. MacIntyre	18
H. F. Lascelles	6

(Reviews are held over till next number.)

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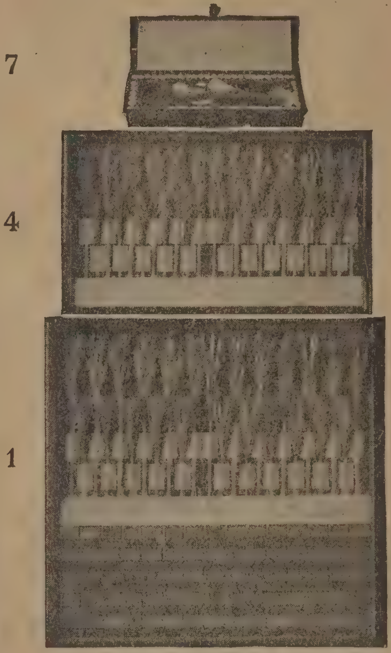

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EDITED BY

STUDENTS AT THE ROYAL AGRICULTURAL COLLEGE,
CIRENCESTER.

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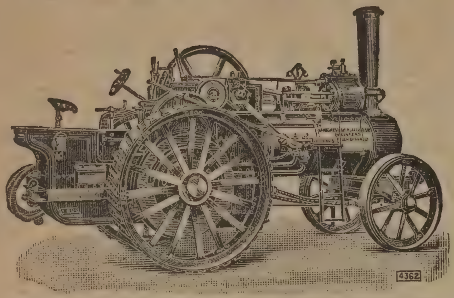

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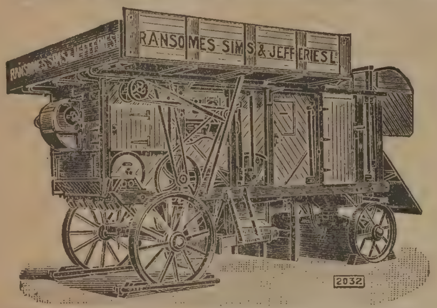

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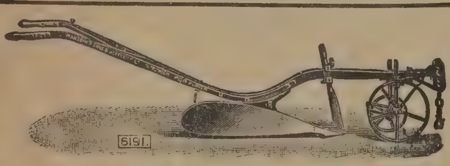

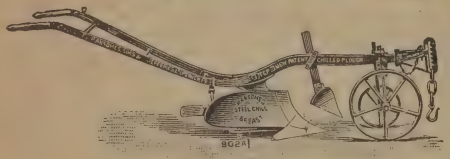

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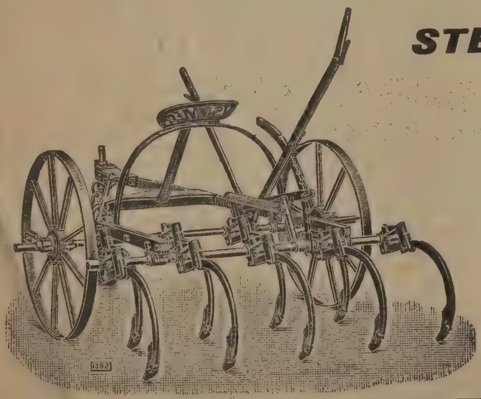

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Agricultural Students' Gazette.

Vol. XVI. APRIL, 1914. No. 6.

KING EDWARD'S WING.

The full £5,000 required to meet the Government advance of the same amount has not yet been collected, but it is expected that by the end of the year this and much more will be in hand. The campaign for funds will not cease when the Government £5,000 has been secured, for King Edward's Wing alone will cost some £11,000, and there are other things needed as much if not more—*i.e.*, (*a*) an extension of the Chemical Department; (*b*) a Drawing Office over the Out-Students' Common Room; (*c*) Extension of the Dairy; (*d*) improvements and extensions at the Steading; (*e*) Greenhouses in the Botanic Garden; (*f*) Assembly Hall and Gymnasium; (*g*) Upkeep and Apparatus Fund; (*h*) Endowment of Chairs, by which alone the finances of the College can be put on a sound footing, and rendered independent of fluctuations in the number of students, which are always liable to occur. A Ducie Chair in Agriculture and a Bathurst Chair in Forestry are obviously indicated as a beginning.

Old Students who have not so far subscribed are earnestly begged to do so, and although a canvass of Present Students is not considered good form the examples of Mr. de Coundouroff and Mr. Husain are well worthy of imitation by those whose parents are in a position to give financial help. Two Old Students have repeated donations, for Mr. W. H. Colby has given a second donation of £5 in addition to the first of £10, and Mr. Alex. Goddard, M.R.A.C., promises a third donation of £2 2s.

Mr. H. H. Wills has been so very kind as to give £100 now, instead of waiting for the first £5,000 to be harvested. And it is important to notice that "*Bis dat qui cito dat*," for every £1 now subscribed secures 20s. from the Treasury. So that all interested in the old College are respectfully requested to "Give early and give often."

The present total is £4,032 6s. 4d., made up as follows (O.S. = Old Student):—Already acknowledged, £3,493 17s. 4d.; H. H. Wills, Esq., £100; Anonymous, £120; Major E. W. Margesson (O.S.), £50; Lord Howard de Walden and Albert Brassey, Esq., £25 each: J. H. Dugdale, Esq., M.R.A.C., Messrs. Ransomes, Jefferies and Sims, and Messrs. J. and F. Howard, £10 10s. each; H. H. Husain, Esq. (present Student), Rufus D. Pullar, Esq. (in memory of Professor Harker), Mrs. Grafton, Nitrogen Fertilisers Co., Oswald Harrison, Esq., and A. Sasson, Esq., M.R.A.C., £10 each; Sir Jeremiah Colman, Bart., Cirencester Chamber of Agriculture, Albert's Basic Slag Co., Anglo-

Continental Guano Co., and Messrs. Harrison McGregor and Co., £5 5s. each; Marquis de Murrieta (J. Olivares), A.R.A.C., John Hughes, Esq., M.R.A.C., E. B. Haygarth, Esq., (Secretary and Solicitor), Mrs. Cadogan, Potash Syndicate, and W. H. Colby, Esq. (O.S., second donation), £5 each; Anonymous, £4 4s.; R. A. Williams, Esq, (O.S., in two donations), £4; F. A. Hyett, Esq. (former Governor), £3 3s.; Mrs. Lee White (mother of O.S.), £3; Alex. Goddard, Esq., M.R.A.C. (third donation), R. E. Thompson, Esq., S. Dennis, Esq., M.R.A.C., J. Milne-Home, Esq., M.R.A.C., W. Parlane, Esq. (O.S.). Messrs. R. W. Hobbs and Sons, Dr. P. G. Gundry (former Professor), A. S. Scorer, Esq., M.R.A.C., H. H. Robinson, Esq., F.I.C. (former Staff member), and Geo. Hughes, Esq., (Molascuit Co.), £2 2s. each; J. P. Millington, Esq., S. Vlasto, Esq., M.R.A.C., Douglas Herman, Esq., F.I.C., W. F. Garside, Esq. (former Professor), Dr. C. P. Hooker, Sir W. Howell Davies, M.P., and C. R. Dames, Esq., £1 1s. each; W. Murland, Esq. (father of O.S.), Mrs. Cator, and C. D. Thompson, Esq. (O.S.), £1 each; Bank interest, £25.

As soon as the plans prepared by the College Architects, Messrs. Oatley and Lawrence, of Bristol, have been approved by the Board of Agriculture, building operations will commence, and the foundation stone will be formally laid in October or November.

J. R. AINSWORTH-DAVIS.

THE CHANNEL ISLANDS.

NOTES: AGRICULTURAL AND OTHERWISE.

At the mouth of the English Channel where it opens out into the broad Atlantic lie the Channel Islands embosomed in the deep bay of St. Michael's Mount, so close to the coast of France at one point that a channel of only seven miles separates Alderney from Cap La Hogue. With beetling cliffs at many points and begirt with reefs displaying hungry jaws there is yet apparent to the visitor as the ship draws near a land on which nature smiles with benign mood. The cliffs descend to the clear water with a carpet of varied verdure, and the rocks themselves bear a luxuriant sea-weed crop.

The visitor approaching from England will, as he enters St. Peter Port, the harbour of Guernsey, behold the town before him climbing up the hill side, and its steep roofs covered with red tiles that give it a foreign air.

The people, loyally attached to their connection with the English Crown as they are and have been from the days when the rest of the Duchy of Normandy was lost, are of the Norman stock. They keep their old laws, customs, and language, and the character of the inhabitants should not be overlooked in considering the use which they have made of the natural advantages of their land. They inherit both the enterprise and the power of organisation and orderly government of the Norman race. The people have the frank independence of those who have been reared in homes that are their own, but withal the whole political system and the land laws in particular are based on the Feudal system. It is a Feudal system no doubt with its tenures amended and developed to meet the altered conditions of more modern days: it is the Feudal system working where from the naturally isolated situation it has bound the people together more for civil government than for the requirements of military service.

I must not, however, dwell on the political forces that have impressed themselves on the life of the islands, and which have kept alive a strong spirit of orderliness, and have ensured down the ages to a man that the results of his efforts will remain assured to him and pass to his children. The position of seigneur and its honourable responsibilities also helped to keep men of family content upon their very modest estates where they gave a lead to their less cultured neighbours in agricultural progress. The very smallness, both of estates and farms, had this advantage, that it drove the younger members of the family to go forth into the wider world; most of them to return at some time to their native island, bringing with them fresh ideas from their experiences abroad. They would return still to find the old home as the family seat. For this end was the law of inheritance as to realty framed. No man can dispose of his land by will. He has absolute freedom to deal with it by sale or otherwise during his lifetime, but at death such real estate as he leaves must pass to his natural heirs. Every child gets his or her share—an inducement to one and all to do what they can for it—but for the eldest son there is besides his share the dwelling and farm buildings. This it will be perceived is a very important privilege: it is intended so that he may be able to remain on the old place. He further has the option of redeeming the portions of his co-heirs, at a valuation under their market value. He may either again pay down the capital value or leave the portions standing as a rent charge—*rente* as the term is. Supposing he starts with such annual charges on his land, he has the stimulus of knowing that industry and success may enable him to pay them off step by step. Again those who own these rentes may dispose of them to anyone by sale, and such an investment offers a ready means for placing out a countryman's first savings. And then when he has a little bit put by he may find an opportunity of buying land. A comparatively small capital will suffice, since he need only pay down in hard cash some 25 per cent. of the price, for the vendor or other lenders will allow the balance to remain in rentes on security of the land.

I have gone to some length above to direct attention to how the ancient laws and customs of these islands seek to facilitate access to the land, to foster ownership and permanency of family connection. The inheritance is diligently cared for and perseveringly improved, and agriculture flourishes. These islands support a larger population per square mile than any other part of Europe, surpassing Belgium. All of them put together make up an area of under 50,000 acres, including a considerable extent of foreshore and some other waste land: the census of 1911 gives their population as 96,000. Compare this with the county of Rutland (a not infertile district), where the acreage is 108,000, and the population 21,000. A thriving agriculture has been able to support and in its turn benefit by a busy commercial and seafaring community. There was a ready home market for farm produce in the days preceding the rise of the present large export trade in market garden produce. The farmers rose to their opportunities: and taking the dairy industry as an illustration, we note how both Jersey and Guernsey developed in their cattle breeds superior to their respective progenitors of Brittany and Normandy. There was method and not mere haphazard good fortune in this matter, for as far back as a century ago both islands were so careful of their breeding that they absolutely forbade the entry of any other cattle, except for immediate slaughter. To-day their foresight is rewarded by a valuable and extensive export of their cattle to America and all parts of the world. Anything between £30 and £50 is an ordinary price for a good average heifer of two years old in-calf, and several animals in the course of the year make a three-figure sum. From Guernsey over 1,000 head go annually, and Jersey exports half as many again.

Taking the agricultural returns, we get the following figures for live stock in Jersey:—

Horses, for agricultural purposes	2,247
Cattle, of all ages	12,031
Pigs	4,629
Sheep	186

This head of stock is maintained on an agricultural area of 20,500 acres (or 46,000 vergées, to give the local standard measure). Of the cattle, about two-thirds are cows and heifers in milk or in calf, the remainder being almost entirely young heifers under two years old. Steers are seldom kept, and only the best bull calves for breeding are reared. The remainder are sent to the butcher at six weeks old, and five shillings represents the value the farmer puts on these at birth.

How such a head of stock is kept on such an acreage (a ratio of one beast, besides horses, etc., to 1·9 acre) may be best set out by taking the account of a Jersey farm, as given by Colonel Le Cornu, a well-known landowner in that island. He says "The farm holdings are small. A great number will be found under 10 acres. From 15 to 20 acres is the average. On an average farm of 20 acres where meadows or orchards do not predominate the distribution of the ground would be much as follows:—

	Vergées.
Hay and pasture	20
Potatoes and roots	15
Corn	10
	*45

The stock on such a farm would consist of 2 horses, 6 cows, 6 heifers, and 5 or 6 pigs."

But despite the number of stock mentioned, and the fact that the prices for butter run from 1s. 6d. to 2s. a lb. (sometimes higher in Guernsey), and the ready retail of milk at 1s. 4d. per gallon, it may surprise the reader to learn that potatoes form the Jersey farmers' chief concern. Some 7,000 acres (over one-third of the agricultural area) are annually put under early potatoes, and this the best of the land. The returns for this are from £300,000 to £450,000 annually, according to seasons. It is a somewhat speculative crop and a few days only sooner or later in the market decides the profit. Thus the first baskets to come in, about the 10th of May as a rule, may make at the rate of £20 a ton; but in a month's time the price will have fallen to say £8 a ton, and by midsummer will be £5. Still, six tons per acre, and it is sometimes eight tons, will even then go a long way to cover the expenses, high as they are. Deep and careful cultivation is needed, the manuring, 20 tons of dung together with 8-10 cwt. of artificial, is heavy, and there is the rent besides. This for the best land runs up to £10 to £12 per acre, while ordinary agricultural land goes at £6 to £8. It is worth noting that rentals in these islands are for the land itself, the farm buildings and dwelling, when not the property of the farmer, being considered separately for rent.

But the food for the large head of stock kept,—how is it provided? Is it largely imported? By no means: except for very moderate rations of bran or oats the islanders feed their cattle entirely on home-grown produce. The parsnip and next the carrot are the crops traditionally relied on for the cattle; and for both quality and quantity of dairy produce there is nothing to equal them. They are expected to yield 20 tons per acre, and of mangels 50 tons is a not unusual crop. In Jersey the potato so monopolises the tillage area that parsnips and carrots, which should be planted early have to give way, and mangels and turnips form the more important portion of the root crop. They follow the early potatoes, which are mostly got off by the end of May, and, the land being in excellent heart from the previous cultivation, mangels even June sown may here produce 30 tons per acre.

Truly it is productive land you will say. Undoubtedly. Yet on examination the soil appears of a rather light nature, neither does chemical analysis reveal unusually high percentages of fertility. It is a soil formed from granite rocks, with but rarely the admixture of other strata. But it is a deep staple, admitting in some places to be ploughed from 16 to 18 inches; it is of a kindly mechanical texture that works freely; and it has good natural drainage making it sweet and wholesome. And this kindliness of soil is joined to a kindly climate favouring vegetable growth. These islands exceed the southern counties of England in the amount of sunshine, and at the same time have an average rainfall of over 40 inches. Above all they enjoy an equable temperature, frost being rare, and the heat of summer tempered by the sea breezes and copious dews to refresh the herbage. Grass grows on up to Christmas, and starts afresh in February: and on fair meadow ground will yield 2 to 2½ tons of hay per acre from one cutting. Lucerne grows freely, and is largely cultivated both for mowing and tethering the cattle on, according to the regular system of grazing.

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* In Jersey 2¼ vergées, in Guernsey 2½ are equivalent to 1 acre.

I have mentioned early potatoes as what Jersey looks to for its chief cash return. The lie of the land in Guernsey sloping towards the north instead of to the south as in Jersey makes her season a few days later, her cultivators do not therefore compete in this crop. Premising that with 6,500 cattle on her lesser agricultural area—some 12,000 acres including land under bulbs and horticultural crops—Guernsey has approximately the same heavy stocking as Jersey, the former has devoted her attention to the market for early vegetables, fruits and flowers. Enjoying abundant sunshine, but subject from her aspect to winds from rough and colder quarters, she has adopted the expedient of growing her best and earliest produce under glass. Those who first entered on this system some forty years ago reaped a rich reward, and there was a rush to follow in their steps. Despite the increasing competition both here and in the South of England, the erection of greenhouses steadily continues year after year, and they are now estimated to be 5,000 in number in Guernsey, with a total length of some 175 miles and an area covered of 700 acres.

Tomatoes are the main and typical produce; two successive crops are taken from the houses each year, the first pickings from heated houses coming in June. £300,000 a year is the average return for tomatoes, being almost one-third of the total value of this import for England.

Other growers prefer a greater range and a change of crop, and early vegetables of various kinds, flowers and fruits taken together, make up about the same value as the returns from the tomato. There is something in the atmosphere, certain predominant rays of light, which gives a special richness of colouring to flowers, among which carnations and chrysanthemums are conspicuous.

I must not omit to notice one other culture that has attained extensive proportions and is still extending. A large area is now under bulbs, particularly narcissus of various sorts: from these a first return comes in from the blooms, then there is also the sale of the bulbs themselves.

The exigencies of time and space forbid me to do more than give this outline sketch. Those who desire to study these interesting islands further will find much information in the Journals of the British Dairy Farmers Association for the years 1891 and 1905, when that body held its annual conferences in these islands.

The inhabitants are a thrifty race, turning the smallest thing to some account, and with patient and laborious work take advantage of the bounties wherewith nature has favoured their native land.

H. Stevens Guille, M.R.A.C.

ROYAL AGRICULTURAL COLLEGE OLD STUDENTS' CLUB.

The annual dinner of the R.A.C. Old Students' Club was held on Wednesday, December 10th, at the Trocadero Restaurant, London, under the presidency of Captain A. G. Weigall, M.P., there being also present Professor J. R. Ainsworth-Davis (Principal of the College), Mr. C. P. Hall (President of the Land Agents' Society), Mr. T. H. Middleton (Assistant Secretary of the Board of Agriculture), Mr. A. Goddard (Secretary of the Surveyors' Institution), Mr. T. McRow (Secretary of the Royal Agricultural Society), Mr. G. R. Gilling Lax, Mr. J. Herbert Taylor, Mr. J. Ruffle, Mr. Hugh Ruffle, Mr. John Hughes, Professor E. Kinch, Professor H. A. Pritchard, Mr. F. Rooper Cooke, Mr. F. N. P. Dunne, Major E. W. Margesson, Lieutenant W. O'G. Cochrane, R.N., Mr. T. Brigg, Mr. J. H. Brigg, Mr. S. Beven, Mr. G. W. Lambert, Mr. F. H. Osmond-Smith, and Mr. E. B. Haygarth (Secretary).

The loyal toasts were given from the chair, and duly honoured.

The Chairman, in proposing the toast of the Navy, Army, and Auxiliary Forces, said although the taxpayer was burdened to the utmost in providing for the upkeep of every form of service, he did not grudge one halfpenny that was spent either on the senior service or the service in which it had been his own privilege to spend a certain number of years. He also held the view most strongly that no man who had health and strength fulfilled his obligations to his country unless he made himself efficient in her defence.

Major Margesson, responding for the Army and Auxiliary Forces, said just before he left the College a unit of the Officers' Training Corps was started there, mainly through the exertions of the Principal, who left no stone unturned to ensure its success, and he hoped by now it was a very strong child, and had attained to that success which it so richly deserved. Personally, he had turned his sword into a ploughshare. The O.T.C. and the Territorials were suffering from great lack of funds, and he hoped the Government would give them a little more encouragement.

Lieutenant Cochrane, who returned thanks for the Navy, said his experience in the Navy and at the College had taught him that there were several things in common between ploughing the sea and ploughing the land. In the Navy one soon realised that before one could teach a man to do a thing one must be able to do it oneself, and on land, if an employer wanted to teach a raw labourer how to handle an implement or a tool he must be able to handle it himself, and he was glad that that fact was duly recognised in the College training. He also learnt in the Navy the value of co-operation, which was also necessary for the farmer, who had not only to compete with his neighbour, but he had to unite with that neighbour in competing with the whole world.

The Chairman proposed the toast of "Agriculture," the industry on which most of those present either directly or indirectly depended, and certainly the industry in which they were chiefly interested. At the present time it was extremely difficult to divorce agriculture from the whirl of the political world. He had given his life to agriculture, and he was far happier on his own farm than he was on the political platform. But circumstances had so ranged themselves that he had been drawn into the political stream, and being in that stream he found he was possibly more animated by the enthusiasm of the youthful politician than by the experience of the practical agriculturist. But agriculture was an industry which had a far greater national aspect than a political aspect, and he was sure all of them were agriculturists first and politicians afterwards. That being so, the last thing they desired was to see their industry become the football of party politics, but rather that such reforms as were necessary should be initiated from the point of view of agricultural advantage, and not from the point of view of electioneering effect. There was a danger in the present day that they as agriculturists might be made the playthings of politics for the most sordid purposes, and he could not help feeling that unless agriculturists as a whole were prepared to consolidate their forces to resist absorption in a purely political atmosphere, great harm would be done not only to the nation as a whole, but certainly to their industry in particular. Although they had of late been receiving a good deal of attention from all shades of political opinion, he could not help feeling that not very much good had accrued in recent years to the industry from the efforts of those who sat in the great councils of the nation. Nor was that greatly to be wondered at, when they remembered that they had always had against them the great commercial and urban interests, who naturally were not philanthropists, and who, as long as they could get what they wanted as cheaply as possible, displayed no great anxiety as to how agriculture fared in the process. But there was another aspect of affairs, especially as regarded agricultural interests, to which he desired to refer, and that was the tendency to hand over to departmental officials legislative powers that ought to belong to Parliament, and judicial powers that ought to belong to courts of justice. He also felt there was a tendency nowadays to disregard what to his mind was one of the greatest factors of the agricultural industry. Up to three years ago he spent his life as a buffer between large landowners and tenant farmers on a considerable acreage in this country, and he was sure his friend Mr. Hall, who had had far greater experience than he had, would agree with him, that in discharging the duties of a land agent of a large agricultural estate it was found that the human element entered to a large extent into those duties and the relationship between landlord and tenant, and between tenant farmer and labourer. That human relationship did not operate to anything like the same extent in any other industry. In agriculture, too, they were dependent on something outside the purview of any human being, however glib and clever a politician he might be, viz., the seasons, Further, the relationship between landlord and tenant was not the ordinary business relationship that prevailed in any other industry They had a fraternal feeling of good fellowship, more than partnership, on our great estates, and if anything was done by legislative effort to undermine that feeling and good fellowship between landlord and tenant, a very severe blow would be struck at the prosperity of their industry. He would mention one piece of evidence to make his point clear. Last year it was his privilege to sit on a committee which the Government saw fit to set up—he being the only member from his side of the House—to inquire into the position in which farmers were placed owing to the abnormal amount of agricultural land coming into the market. Mr. Hall was for three hours in the witness box before that committee, and he gave evidence as representing one of the largest landowners and as representing the whole of the land agents in the country in charge of ten million acres. On the evidence he gave and the evidence of the other witnesses the committee—men holding all sorts of political views, and everyone of the twelve members he was certain desirous of finding a remedy from the point of view of agricultural advantage and from no point of view of political partisanship—unanimously incorporated these words in their report : " The tenant farmer witnesses before the committee were unanimous in expressing the view that they desired nothing better than the relation of tenants under their present landlords, in view of the remission of rents in bad seasons, and in view of the expenditure in repairs over and above the agricultural requirements of their holdings." So far as reforms which were necessary for the future of the industry were concerned, without going into them in detail he would say in general that they desired that there should be the same sense of security for capital invested that every other interest and every other industry desired and required. They had got three main interests : the fixed capital, the land, the landlord's interest ; the floating capital, stock and machinery, the tenant's interest ; and the muscle and sinew, the labourer's interest. In minor details those interests might have a certain amount of differences—he could not say antagonism—but in the main all they asked was that the landlord should have the same security for his fixed capital, the land, as other forms of capital had; that the tenant should have security of tenure—and let him say that if there could be shown to be a clear demand and a reasonable demand that when a tenant was disturbed in his holding for the purpose of sale or any other purpose that the present law did not give him adequate compensation for, by all means amend it. But however much in theory they might say that the tenant ought to have more compensation than the present Agricultural Holdings Act gave him, in practice he could not help thinking that was a matter for the valuers. He knew of no act of cultivation or manuring for which the present Act did not give the valuer ample power to recoup the tenant. Before the committee to which he had referred they asked every witness whether he could draft a clause to be incorporated in a Bill to give the tenant adequate compensation, but they never got that clause. So far as the labourer was concerned, he felt strongly that no agriculturist desired that any labourer should receive other than a fair day's wage for a fair day's work, but if they were going to standardise the rate of wages every labourer was to receive, how would they get over the economic law of supply and demand? They might legalise the rate of wages, but they could not compel a man to pay it, nor legalise the amount of labour he was going to employ. Agricultural reformers who were possibly animated more by political partisanship than by practical knowledge ought to consider for a moment what was to be the practical effect when they came up against economic laws. If the labourer's position could be improved consistently with observing economic laws, by all means do it. But over and above security and compensation for all forms of capital they desired that agriculture should not bear burdens over and above any other industry. To-day they were bearing burdens which the nation as a whole ought to bear, and if the nation would take a patriotic view and bear the cost of those national services which were now placed on local rates, the position of the tenant farmer and the labourer would be so improved that the cure would automatically be found for many of the difficulties that now existed. In coupling the toast with the name of Mr. Middleton, let him say that although he disagreed with the political views of Mr. Middleton's chief, he desired to pay his humble tribute to the energy and enthusiasm that Mr. Runciman had thrown into the work of his department. He was sure Mr. Runciman was desirous of lifting agriculture from the plane of political partisanship to the national plane of statesmanship. He had shown that by the regulations he issued last year with reference to foot-and-mouth disease, and although from the point of view of administration he should like to see Mr. Runciman for very many years at the head of his great department, for other considerations he feared he could not cherish that aspiration. He felt that to all the officials at the Board of Agriculture they owed a deep debt of gratitude if for no other reason because of the enormous efforts, and the successful efforts, they had made to keep their flocks and herds freer from disease than the flocks and herds of any other country in the world, and thus maintained British supremacy in the production of high-class live stock. For those reasons he asked them to drink to the success of their industry, and success to the Board of Agriculture, coupled with the name of Mr. Middleton.

Mr. T. H. Middleton, having thanked the Chairman for his kind references to the Department which he had the honour to serve and to the energy and attention which Mr. Runciman had given to his task, said he was sorry circumstances precluded him from following the Chairman in many of the interesting topics he had introduced. At the Board of Agriculture they thought of their Students' Club and the College at Cirencester from various points of view. In the first place, in their colleague, Mr. Cheney, a representative of their College, they had a very valuable officer to remind them of the good training provided at Cirencester; and they had experience which indicated that not only their Chairman but many other students from Cirencester were giving their lives to agriculture and for its benefit. Since he last had the honour of dining with them they had lost from the Board of Agriculture one of their best men, Mr. A. E. Brooke-Hunt, now retired. Some of them knew him very well. He was one of their gold medalists. He had served the Board for 20 years, and there were few who knew so well as he (the speaker) did what good service Mr. Brooke-Hunt rendered to the Board of Agriculture and to the cause of agricultural education. Twenty years ago agricultural education was not in the somewhat flourishing circumstances in which it was to-day, and Mr. Brooke-Hunt in struggling to develop agricultural education had a very hard task in front of him. He worked for twenty years, and with great success, but his health broke down very largely from overwork, and it is one of his great regrets that Mr. Brooke-Hunt was forced to retire long before his appointed period, and before his good work for agricultural education was generally publicly recognised. He felt sure, however, that they who were his colleagues and fellow students realised his work, but he did not think the public knew how much agricultural education in this country owed to their old student at Cirencester. Also since he last dined with them another old Cirencester student had left the public service, Mr. James Mollison, who in charge of the Indian Agricultural Department did for India what Mr. Brooke-Hunt did for England. At the Board of Agriculture they depended to a large extent on the co-operation of the agricultural educational institutions, now somewhat numerous in this country, and in framing their schemes they tried to arrange that certain work should be undertaken at certain places. In connection with Cirencester they thought there was an opportunity of utilising some of the skilled knowledge of some of their teachers in developing a subject which had hitherto been hardly developed in England, he referred to Forestry. They were fortunate in securing the co-operation of the Cirencester College, the Governors became responsible for advisory work for the South-West of England, and Professor Pritchard was appointed official adviser. He had recently had the pleasure of reading Professor Pritchard's first annual report, and he was delighted to find how much Mr. Pritchard had been able to accomplish in the first year he had occupied that post. He was sure work of that sort undertaken by their staff for the benefit of agriculturists in the South-West of England must have a great influence not only on forestry, but also on the progress of the Royal Agricultural College. Speaking for the Board of Agriculture, their primary object was to stimulate an interest in forestry, and their secondary object was to promote the interest of such institutions as the one over which Professor Ainsworth-Davis so ably presided.

Mr. A. Goddard, in proposing the toast of "Success to the Royal Agricultural College," said it was 25 years since he left Cirencester, and during that time many things had happened. When he was at Cirencester he thought the only competitors with the Royal Agricultural College that might be said to count were Downton and Hollesley Bay, though the latter could hardly be reckoned, as it catered more particularly for the Colonies, whereas Cirencester catered more particularly for English agriculture and land agency, although a lot of work was done for Imperial and international purposes. Since then competition had very much increased, a number of other colleges being started, most of them receiving heavy subsidies. That no doubt at one time hit Ciceter rather hard, but in the result it really proved a healthy tonic, for all of them were inclined to get into a groove, and possibly the tonic of competition had had a very desirable effect. At any rate, they knew that the numbers were increasing, and that the appeal made for the extension of the College buildings seemed likely to have a successful result, thanks mainly to the enormous amount of work which Professor Ainsworth-Davis had put into it. In a small way he had tried to do something in the same direction, though he was sorry to say not altogether successfully, for in writing to various friends who had been at Cirencester he found that many of them since they left Cirencester had formed other ties and interests, and had many other calls upon their pockets. But the Royal Agricultural College would be as successful in the future as it had been in the past, and when they had with them that evening a member who was at the College 50 years ago, and recalled those who had become famous in responsible positions in India, in the Colonies, and at home, they had reason to congratulate themselves on being connected with an institution that had turned out such men. But though he felt no misgivings as to the future of the College itself, he had some doubt as to the future of the men who were now going there. Many of the students had hitherto gone to the College to learn land agency—he was one of them himself—and he was afraid rather from certain speeches they had heard lately, that in ten years' time a land agent would be a *rara avis* who would be shot on sight and stuffed and put in a museum. He would therefore advise students not to go in for the land agency side but to take to farming on their own account, and then when the land courts were set up they would be able to go in for a reduction of rent, and then after living on their landlords for a few years they might get a great reduction. In coupling with the toast the name of Professor Ainsworth-Davis, he congratulated the Principal most heartily on the valuable work he had done during his comparatively short tenure of his office, and the splendid manner in which he had brought the College to the front so that it need fear comparison with no other similar institution in Great Britain.

Professor Ainsworth-Davis said they would expect him to give some account of his stewardship for the last year. The work of the College had been quite satisfactory, and he thought he could assert that the standard of the work had been gradually screwed up, which was a very important thing. Different kinds of research work had been carried out, although they had been handicapped by the obsolete nature of their appliances, and no doubt in future, when they got their new buildings, their research work would go on hand in hand with teaching more thoroughly than it had ever yet done, for no teaching could be adequate or stimulating unless it was associated with the influence of research. The unit of the Officers' Training Corps, so far as numbers permitted, were doing quite well. The numbers of students at the College, though not exceedingly large, were satisfactory, and were larger than at any time since their reorganisation in 1908, when they became a public body and began to receive State grants. As regarded finding posts for old students, they regarded it as one of their most important duties to find suitable posts for suitable men. He could say for his colleagues and himself that they were only too anxious to help a competent man by finding him a decent berth. It was very cheering indeed to hear his old friend and at one time colleague, Professor Middleton, speak in such high terms of appreciation of a number of old students with whom he had been brought into close contact—especially of Mr. Brooke-Hunt, with whose valuable work for agricultural education he had been brought into close association both at Aberystwyth and at Cirencester. One important fact in the history of the College during the past year had been the interesting meeting they had at Crewe House in the month of May to promote the appeal for the building fund, when Lord Crewe, himself an old student, kindly presided and delivered a speech which ably summarised the position and set out the needs which they had to fultil. At that time a committee of old students was appointed to assist in promoting the appeal, Mr. Goddard kindly undertaking the post of secretary, and to the names of that number were added two other names that had helped their cause considerably and that would do so still more, the names of Lord Curzon of Kedleston and Lord Milner, who now showed that they realised and appreciated the importance of the Imperial work carried out by the College. Having referred to the agitating experience occasioned during the present term by the fire at the College, and mentioned that the rebuilding of the destroyed portion would fit in with the extension scheme, he went on to speak of the building fund. The Development Commissioners had offered them £5,000 for extension on condition that they raised a like sum from voluntary sources, and he believed even if they did not reach the full £5,000 the Development Commissioners would give pound for pound for what they raised, so that they should get an appreciable grant. Up to now they had obtained £3,500, of which sum £586 had been subscribed by 59 old students, in addition to which they had received £400 more, so that old students might be described as indirectly responsible for £1,000. Having obtained two-thirds of the total sum to be raised they had secured enough to go ahead, plans had been drawn up, and the foundation stone of the King Edward Wing would be laid in the spring. They should then be able to compete with any other institution, because the College was erected at a time when the ideas about teaching were comparatively crude, and the need for modern lecture rooms, laboratories, and appliances had not been realised. They did not, however, mean to limit their plans to the £5,000 now asked for. He was out to obtain £30,000, and as much more as he could get, and when they saw the thousands lavished on other and newer institutions he did not think the Royal Agricultural College would ask in vain for the funds needed to place in it a position worthy of its work and reputation. He hoped all present would do their best to interest their friends in the College, and then all would be well.

Mr. T. H. Brigg proposed the toast of the Royal Agricultural Society of England, coupled with the name of the Secretary, Mr. McRow, who responded.

The Chairman proposed the health of "The Visitors," and Mr. C. P. Hall returned thanks.

Professor Kinch proposed the health of the Chairman, who, having replied, gave the health of Mr. Haygarth, whose response concluded the toast list.

METEOROLOGICAL OBSERVATIONS, 1913.

The meteorological events of the year 1913 are connected with a wet spring, a dry summer which was neither sunny nor warm, and a mild autumn. A striking feature was the absence of any very high or very low readings of temperature all over the country.

The rainfall for the year was generally for the country as a whole slightly below the average, although in many parts of the South-West of England there was a small excess. The number of rain days was also generally under the average. The total fall at the College station was 30·53 inches, measured on 184 days, being ·20 inches below the average for the year. The greatest daily fall of rain was 1·35 inches on January 11th; other heavy falls were measured on January 4th (·99 inches), October 4th (·97 inches), and April 15th (·83 inches).

During the middle of February very little rain fell in the neighbourhood; from the 10th to the 24th of the month, practically no rain was measured with the exception of about a tenth of an inch on the 15th. Very little rain fell in the first part of April, and the second half of the month of May, June, July, and August were very dry months, only 2·85 inches being measured at the College station, showing a deficiency of 5·54 inches for the three months. During the last three weeks of June only ·17 inches of rain fell, while in the last three weeks of July and the first week of August only ·22 inches were measured. No rain fell on the 18 days from July 22nd to August 8th. Very little rain fell in December after the first week, only ·13 inches being measured between the 7th and 25th of the month. The absence of rain during the months of June, July, and August and the greater part of December was common over a wide area in England.

Rainfall measured at the R. A. College Meteorological Station, together with the monthly deficiency or excess (in inches).

1913.	1913 Rainfall.	Average for month.	Difference from average.
January	5·22	2·52	+ 2·70
February	1·60	2·27	− ·67
March	3·76	2·01	+ 1·75
April	4·30	1·97	+ 2·33
May	2·42	2·08	+ ·34
June	·79	2·39	− 1·60
July	·93	2·85	− 1·92
August	1·13	3·15	− 2·02
September	2·48	2·69	− ·21
October	3·56	3·15	+ ·41
November	3·03	2·97	+ ·06
December	1·31	2·68	− 1·37
For the whole year ...	30·53	30·73	− ·20

All over the country the mean temperature for the year was above the average, the most remarkable feature being the absence

METEOROLOGICAL OBSERVATIONS AT THE R.A.C., 1913.

Week ending	Temperature.				Rainfall.			Earth Temperature.			Bright Sunshine.						No. of nights frost on grass.	Lowest temperature on grass. F°
	F°. Max.	F°. Min.	F°. Mean	Monthly mean, 1913, and average monthly mean (in italics)	Inches.	No. of days.	Monthly Rainfall, and average ditto (in italics)	1 ft.	4 ft.	Monthly Mean.	Daily mean.	Average.	Percentage	Average percentage	Monthly mean, and averages (in italics).	Percentage possible and average percentage (in italics).		
Jan. 4	46·4	35·9	41·4	38·5	1·15	6	5·22	43·5	45·6	41·1 (1 ft.)	1·0	1·5	13	19	1·08	13	1	29
11	45·7	36·9	41·5		1·60	4		43·6	45·2		·3	1·5	4	19			1	29
18	40·0	28·1	34·3		·48	5		39·8	44·6		1·8	1·5	22	18			4	23
25	45·4	33·3	39·6	*[37·3]*	1·22	4	*[2·52]*	39·5	43·3	44·2 (4 ft.)	·8	1·7	10	21	*[1·52]*	*[19]*	2	27
Feb. 1	41·9	32·4	37·3	38·5	1·10	6	1·60	40·2	43·0	40·1 (1 ft.)	1·6	1·9	18	22	2·36	24	3	26
8	49·0	35·3	42·2		·94	7		41·2	43·1		·3	2·2	3	23			1	28
15	47·6	30·3	39·0		·33	4		41·5	43·7		2·7	2·5	28	26			4	25
22	38·9	29·1	34·0	*[38·4]*	—	—	*[2·27]*	38·5	43·0	42·9 (4 ft.)	3·4	2·8	34	28	*[2·57]*	*[26]*	6	25
Mar. 1	45·6	31·7	38·7	42·0	·30	3	3·76	38·9	41·9	42·1 (1 ft.)	2·2	3·1	21	29	3·73	32	4	24
8	49·9	37·1	43·3		·32	5		42·0	42·5		4·1	3·4	37	30			1	30
15	50·4	34·3	42·1		·86	5		42·4	43·3		2·5	3·6	22	32			3	27
22	47·6	32·6	39·9		1·63	7		41·6	43·6		3·3	3·9	28	33			1	26
29	49·7	35·0	42·1	*[40·9]*	·68	4	*[2·01]*	42·5	43·5	43·2 (4 ft.)	5·3	4·3	43	35	*[3·74]*	*[32]*	1	30
Apr. 5	51·3	36·9	43·8	45·5	·33	4	4·30	43·7	44·1	45·3 (1 ft.)	4·4	4·6	34	36	3·73	27	1	29
12	48·0	36·4	41·9		·57	2		44·2	44·5		3·1	5·0	23	37			1	30
19	50·6	35·3	42·6		1·42	5		44·1	44·8		3·8	5·3	27	38			2	26
26	58·7	40·3	49·1	*[45·5]*	·86	6	*[1·97]*	47·1	45·4	45·0 (4 ft.)	5·2	5·7	36	39	*[5·23]*	*[38]*	—	32
May 3	56·1	40·1	47·7	51·5	1·56	5	2·42	48·5	46·8	51·2 (1 ft.)	3·0	6·0	20	40	6·96	45	—	33
10	53·0	39·6	45·9		1·28	6		47·9	47·3		3·1	6·3	21	42			1	30
17	61·4	41·3	50·8		·36	3		49·6	47·4		8·2	6·5	53	42			—	33
24	60·0	42·1	50·5		·22	3		51·3	49·1		7·3	6·7	46	42			—	32
31	71·9	48·0	59·2	*[50·7]*	·18	2	*[2·08]*	56·8	52·1	48·8 (4 ft.)	9·9	6·8	62	42	*[6·58]*	*[42]*	—	43

June 7	65·4	43·7	53·8	57·7	·45	3	·79	57·1	52·9	57·8 (1 ft.)	8·2	6·7	50	41	6·51	40	—	37
14	62·7	45·1	53·3		·19	3		55·7	53·5		4·5	6·6	28	41			—	39
21	72·1	49·9	60·2		·11	3		59·0	54·2		5·9	6·5	36	40			—	46
28	72·4	47·0	58·8	[*57·0*]	·04	2	[*2·39*]	58·5	55·0	54·0 (4 ft.)	6·1	6·4	37	39	[*6·50*]	[*40*]	—	42
July 5	70·7	52·1	60·8	60·2	·06	2	·93	61·8	55·9	60·2 (1 ft.)	5·0	6·4	31	40	3·75	24	—	46
12	65·3	47·9	56·0		·65	3		59·1	56·7		1·4	6·4	9	40			—	41
19	67·2	53·9	60·1		·21	4		60·1	56·6		1·6	6·4	10	40			—	44
26	68·6	52·2	59·8	[*60·3*]	·01	1	[*2·85*]	59·4	57·0	56·7 (4 ft.)	6·5	6·4	42	41	[*6·42*]	[*40*]	—	44
Aug. 2	72·3	55·0	63·1	60·3	—	—	1·13	61·3	57·5	60·8 (1 ft.)	7·8	6·3	51	41	4·58	32	—	46
9	67·5	50·3	58·4		·14	1		61·5	58·0		4·8	6·1	32	41			—	41
16	68·7	53·3	60·5		·44	3		60·4	57·6		2·4	5·9	16	40			—	41
23	67·7	50·6	58·6		·17	2		60·4	58·2		5·8	5·7	41	40			—	41
30	72·2	50.1	60·5	[*59·0*]	·30	1	[*3·15*]	60·5	58·0	58·0 (4 ft.)	4·8	5·4	35	39	[*5·87*]	[*41*]	—	40
Sept. 6	64·4	53·4	58·6	57·4	1·50	4	2·48	59·3	57·8	57·7 (1 ft.)	·7	5·1	5	39	4·02	32	—	50
13	66·2	49·0	57·2		·32	3		58·6	57·4		6·1	4·8	48	38			—	42
20	61·3	46·1	53·3		·37	3		56·1	56·9		4·1	4·5	33	36			—	40
27	67·6	51·5	59·2	[*55·1*]	·36	2	[*2·69*]	56·9	56·2	57·0 (4 ft.)	4·0	4·2	34	36	[*4·63*]	[*37*]	—	43
Oct. 4	63·7	50·8	57·1	51·2	1·32	4	3·56	57·6	56·4	53·3 (1 ft.)	3·0	3·9	26	34	2·56	25	—	44
11	55·3	47·1	51·1		1·14	7		54·8	55·2		1·1	3·5	10	32			—	38
18	58·4	41·7	49·8		·18	2		53·2	55·1		3·7	3·2	36	31			—	31
25	55·3	41·0	47·9	[*47·6*]	·18	3	[*3·15*]	51·8	54·2	54·7 (4 ft.)	3·5	2·9	35	29	[*3·26*]	[*31*]	—	32
Nov. 1	58·9	44·0	51·2	46·5	·97	6	3·03	50·6	53·3	47·7 (1 ft.)	3·0	2·6	31	27	2·73	31	—	36
8	52·3	38·4	45·4		·49	5		49·1	52·4		4·1	2·3	45	25			—	32
15	54·4	39·4	46·9		1·62	6		47·9	51·1		3·1	2·0	36	23			1	28
22	52·7	41·7	47·2		·66	4		47·8	50·3		1·5	1·8	18	21			—	31
29	51·3	33·7	42·5	[*41·9*]	·03	1	[*2·97*]	45·6	49·5	50·8 (4 ft.)	2·0	1·6	25	20	[*1·9*]	[*22*]	3	28
Dec. 6	49·3	41·3	45·5	39·6	·97	6	1·31	46·9	49·0	43·3 (1 ft.)	·8	1·4	10	18	1·37	18	1	30
13	52·0	37·5	44·7		·04	3		45·2	48·4		1·1	1·3	14	17			1	29
20	46·1	35·4	40·7		·02	1		43·8	47·8		1·4	1·2	19	16			—	31
27	41·6	30·6	36·1		·29	3		40·9	46·4		1·0	1·3	14	18			3	27
	39·2	25·0	32·1	[*37·6*]	·02	1	[*2·68*]	38·9	45·1	47·6 (4 ft.)	2·7	1·5	33	19	[*1·26*]	[*16*]	6	18*

* On January 1st, 1914.

Lowest Minimum in December was 20° F. on the 31st.

of any very high or very low readings. The monthly mean temperature, as measured at the College, was below the average only in July, the deficiency for this month being ·1°F. The mean temperature for the year was 1·4°F. above the average. May was an extremely variable month, with frost on the 7th and unusual heat from the 25th to the 30th; the maximum reading was above 70° on these days, reaching 77·5°F. on the 26th; the nights were also very warm, the minima being about 50°F. The highest temperatures of the year were registered on the 16th and 17th of June in most parts of the country, the highest recorded temperature at the College being 80°F. on the 16th June. The last four months of the year were remarkable for their mildness, but the lowest temperatures of the year occurred during the frost towards the end of December. The lowest temperature measured at the College was 19·7°F. on the last day of the year.

MONTHLY MEAN TEMPERATURES AND AVERAGE MEAN FOR MONTHS, 1913, compiled from R. A. College Station records (in degrees F.)

1913.	Monthly Mean Temp.	Average Mean.	Difference from average.
January	38·5	37·3	+ 1·2
February	38·5	38·4	+ ·1
March	42·0	40·9	+ 1·1
April	45·5	45·5	0
May	51·5	50·7	+ ·8
June	57·7	57·0	+ ·7
July	60·2	60·3	− ·1
August...	60·3	59·0	+ 1·3
September	57·4	55·1	+ 2·3
October	51·2	47·6	+ 3·6
November	46·5	41·9	+ 4·6
December	39·6	37·6	+ 2·0
For the whole year ...	49·0	47·6	+ 1·4

The duration of bright sunshine was everywhere considerably less than the average. At the College station there was an excess over the average only in the months of May (12 hours), November (25 hours), and December (3 hours). The greatest deficiency occurred in April (45 hours), August (40 hours), while July gave 83 hours below the average. The total number of hours of bright sunshine, measured at the College, was 1,320 hours, as compared with the average of 1,508 hours. The highest records were, as usual, in the southern parts of the country, while at many places in the north very small aggregate totals for the year were measured, 814 hours at Hull, 884 at Manchester.

The percentage of possible duration for the year at the College was 30 per cent., as compared to the average of 34 per cent.

Table of Bright Sunshine for Months in 1913, compiled from the R. A. College Station records.

1913.	Hours.			Percentage.		
	No. of hours.	Average for month.	Difference from average.	Percentages of possible duration.	Average percentage.	Difference from average percentage.
January ...	33	47	− 14	13	16	− 3
February ...	66	72	− 6	24	26	− 2
March ...	116	116	0	32	32	0
April ...	112	157	− 45	27	38	− 11
May ...	216	204	+ 12	45	42	+ 3
June ...	195	195	0	40	40	0
July ...	116	199	− 83	24	40	− 16
August ...	142	182	− 40	32	41	− 9
September ...	121	139	− 18	32	37	− 5
October ..	79	101	− 22	25	31	− 6
November ..	82	57	+ 25	31	22	+ 9
December ...	42	39	+ 3	18	16	+ 2
For the whole year ..	1320	1508	− 188	30	34	− 4

Mean Temperatures, Rainfall, and Bright Sunshine for the Whole Year, 1913, together with averages (R. A. College Station records.)

	Mean Temperature. ° F.	Mean Earth Temperature. ° F.		Rainfall for the year (in inches).	Bright Sunshine.	
		1 ft.	4 ft.		Total in hours.	Percentage of possible.
1913 ...	49·0	50·0	50·3	30·53	1320	30
Average ...	47·6	—	—	30·73	1508	34

FARM MACHINERY AND POWER.

THE SIGNIFICANCE OF LARGE UNITS.

In a recent note* on the work of the Office of Farm Management of the United States' Department of Agriculture, Mr. Spillman, of that office, referring to the "Farm Management Surveys" which are becoming one of the most important features of its work, writes: "In this work, groups of not less than six hundred farms are studied in sufficient detail to determine the labour income of the farmer. In these studies the gross income and the total expense of each farm are determined. The labour income is then calculated by deducting from the net income of the farm, interest on the capital invested and the value of unpaid labour performed by the members of the farmer's family. What is left is considered to be the labour income of the farmer himself."

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* Monthly Bulletin of Agricultural Intelligence and Plant Diseases, issued by the International Institute of Agriculture, Vol. IV., Number 7; July, 1913.

"One result of these studies has been to indicate that on an average the income of the farmer is sufficient to maintain the farm and its equipment, pay interest on the investment, and ordinary wages to the farmer. It is thus seen that farming compares favourably with other industries in which there is free competition and in which production is limited only by demand."

"It has been found that generally speaking the size of the farm is a very important element in profit. With many exceptions it has been found to be a general rule that the larger the farm the larger the labour income. In those sections of the country where the average farm is large, and where the farmer uses large teams and large machinery, the labour income rises considerably above the average. On the other hand, in those sections where the farms are small and where the farmer uses small teams and implements, the average labour income is below the average for the country. It would be interesting to know whether these conditions hold in other countries than the United States."

At first sight, the answer to this query would seem to be obviously that, presuming the possession by the farmer of intelligence proportional to his opportunities, his "labour income" would vary with the square of the size of his farm. But, firstly, such a presumption is not entirely warranted, and, secondly, it is a matter of common knowledge that when farm operations become more extensive than the farmer himself can supervise, gross profits begin to fall, relatively, as the wages of supervision increase.

On the other hand, presuming only average intelligence on the part of the farmer and all his staff, there is a fundamental economic fact underlying the general rule commented on in the above quotation, and which is probably worthy of appreciation by English farmers who cannot as a rule increase indefinitely the size of their farms.

This fact is merely that, *efficiency of control being the same, the gross results of any expenditure of physical energy will be proportional to the amount spent.*

None will dispute this proposition, it is really quite obvious—and yet, does everyone quite realise what it means ?

It does not mean, for instance, that a mere duplication of the capital devoted to any object will double the net profits ; for interest and depreciation will be doubled, and, in order that the efficiency of control may not be decreased, wages will frequently have to be doubled as well.

No, there is only one item that does not commonly increase proportionately with the amount of physical energy controlled with constant efficiency; and that is the item of skilled labour. The skilled labourer, employed with discretion, can almost always be made worth more than his hire, the reason being that it requires no more skill to drive a large machine, a large engine, a large horse, than it does to drive a small one; and that, provided the increase of size is utilised to its full capacity, the results are proportionately great.

The American farmer buys horses by weight—so much per pound—and uses them in large teams, but he uses machinery up to the limit of size that his team can draw. His capital expenditure is little less in consequence, but the number of his hired hands is inversely proportional to the weight of his teams.

This point has been dealt with elsewhere,* from the labourers' point of view. The labourers' wages will, of course, ultimately rise—as they have risen in America—and absorb the profits, as such improved practices become general: but meanwhile the employer who leads in the matter of increasing the scope of his skilled hands, will reap his reward; and the industry that leads in the same direction will find it easier to attract labour, as wages in that industry rise.

The low rate of English agricultural wages is exciting much comment at the present time, and every sort of quack remedy has been suggested; but an increase of the labourer's value must precede any increase in his wages, and there are only two ways in which the desired result can be brought about. One of these is to increase the labourer's skill—which he would probably then use elsewhere, and the other is to increase his scope—which he can only exercise on the land where such scope is provided.

Improved education provided by the State has depleted the English countryside because it has not gone hand in hand with development of agricultural opportunities.

The coming of the motor plough will probably bring a great change about; but if the horse is to survive in British farming (and though the form in which it takes its fuel is an expensive one, it is perhaps quantitatively the most economical consumer of power known), it will be the heavy, slow horse, easily controlled, drawing—perhaps in a large team—machinery that covers a great breadth of ground, on areas that for geological or other reasons are unsuitable for the employment of mechanical power.

Do farmers realise this? Is the demand for the heavier, as compared with that for the lighter breeds of horses, surviving the passing of the town dray; and if not, is it because the larger and very efficient implements now obtainable are not appreciated?

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* The Agricultural Journal of India, Vol. VIII., Part 2; July, 1913: "Ways and Means of Indian Agricultural Development."

And there is another aspect of this question of increasing the scope of agricultural labour.

What about small holdings ?

When the knowledge and skill, in cultivation and preparation for market, of the produce now commonly grown on small holdings, have become general—as they are rapidly becoming—what hope is there for the small holder ? And the answer is "*Only in the intelligent use of more power.*"

Probably every educated small holder in Britain should have a windmill, and—when they become cheaper—an accumulator, unless he can obtain electricity on tap. And it is a vital matter for him to find some means of utilising what power he can get.

Are our implement makers considering the possibility of this demand ?

The writer, not able to answer these questions himself, submits that they are worth considering by all who have the interests of the English countryside at heart.

Pusa, Bihar, India. A. C. DOBBS.

AMONG THE BATTAKS.

The aborigines of Sumatra are known as "Battaks," with the exception of the inhabitants of the northern part of the island, which is peopled by the Achinese. The Battaks of the hills are quite a fine race of men, but those of the plains are degenerate. Both, however, live in similar villages, and all speak the same language, the following remarks, therefore, apply more or less to them both.

The life of a Battak is almost ideal. Poverty is unknown. The staple food is rice, which is very easily cultivated ; fish are plentiful in every stream ; and fruits such as pineapples, oranges, bananas, mangoes, durians, and mangosteens flourish all round the villages. Coconuts are also extensively grown. The Battak seems to get the maximum of enjoyment out of life with the minimum of work. The men indeed spend most of their time in hunting (deer and wild pig) and fishing. the women garnering and threshing the rice. The Hill-Battaks breed a special kind of pony, known as the Battak or Deli pony. It is an exceedingly hardy animal, about the size of a New Forest pony, and eminently suited to the needs of the country. They are rapidly becoming popular outside Sumatra, and numbers are shipped yearly to the Malay States.

In virgin jungle it is difficult to realise the proximity of a village until one is actually in it. But in those parts of the country where the European has developed estates for the cultivation of tobacco, rubber, etc., the precincts of the villages are well defined, as by Dutch Law the Planters must leave round every "Kampong" a certain amount of land—which is generally left by the Battaks in its virgin state. Also after the village boundaries have been marked out by the Planters, the Battaks proceed to grow a thick bamboo hedge, which frequently attains to a height of 40 or 50 feet.

The villages are always situated by the side of a river. It is no uncommon sight upon entering a "Kampong" through one of the narrow paths which intersect the outlying jungle to see a whole family enjoying a swim.

The houses are built on piles about five feet from the ground, the walls are of plaited bamboo, and the roof a thatch of palm leaves. The floor is made of bamboo poles, and the interior consists of one room only, in which the family sleeps. Cooking is done on the ground under the house. The plaiting of the bamboo walls is rather an ingenious process. Young bamboos are selected, as nearly as possible the same size, and then opened out flat by means of splitting one side and cutting deep parallel lines down the inner wall. The result is a pliable bamboo strip from six to nine inches wide. Bamboo is widely used as building material, being very strong and light. Very often the steps of a house consist of one bamboo with notches cut into it, big enough to admit the ball of the foot.

The villages follow no order, the houses being dotted here and there in a cleared space. There is always one special house, known as the Guest House, the interior of which is more highly ornate than the rest, and a sort of club-house, which is built without walls, where the villagers can sit and gossip, play or mend their fishing nets. In every "Kampong" there is a diminutive house perched at the top of a long pole like a dove-cot. This is the "Head-house," where the skulls of the departed Penghulus (chiefs) are kept. Every village has its own chief responsible to the Sultan for the good behaviour of the inhabitants.

It is an extraordinary thing and difficult to account for that many Battaks are exceptionally clever chess-players. Their own game varies slightly from the European, but they are equally skilful at both. Where they learned the game remains a mystery, however, for when asked they always reply "My father taught me!"

The writer once saw on the floor in a corner of a chief's house a very passable imitation of a violin constructed by the chief himself, the strings being made of twisted fibres of the Murgat palm. The skilful native musician was able to produce quite pleasant sounds from this crude instrument, which had been for some time discarded in favour of the real thing, of which he was much more proud, having bought the cheap imported article at some native stores.

The moment a stranger enters a village he is saluted by the barking of dozens of pariah dogs. The din is appalling, but it is only noise, as they are very careful not to come within stick or boot range. Then all the children pour out of the houses, more or less naked, and gape with wonder. If the Penghulu is present he welcomes the stranger and engages him in friendly conversation. Meanwhile some active lieutenant climbs a coconut palm, cuts off one or two young coconuts, and is ready with them just as the Penghulu politely enquires after the thirst of his visitor. The end of the coconut husk is quickly hacked off, a hole is pierced in the shell, and the visitor is expected to tilt it heavenwards and drink the milk within. An ordinary sized fresh young coconut contains about a pint of clear liquid. On leaving he is conducted by the Chief, followed by the children and dogs at a respectful distance, to the extreme boundary of the village, where he is bowed out with many expressions of goodwill and courtesy.

P.

R.A.C. LITERARY AND DEBATING SOCIETY.

On Monday, March 9th, a meeting of the Society was held in the Out-Students' common room, the principal business of the evening being a debate on the motion—" That in the opinion of this house, the Nationalisation of Railways in the British Isles is desirable." This was proposed by Mr. Baring, who attempted to show that in those countries where a system of national control had been adopted, the results had been to the advantage of the travelling and freight sending public. Mr. Baring assured the house that he spoke from a personal knowledge of the railways of most of the civilised countries of the world. He also displayed some statistics to show that the cost of running these national railways was less than those under private management.

The opposition was led by Mr. Glossop, who delivered a thoughtful and reasoned speech, in the course of which he reviewed the history of railway nationalisation in the countries of Europe, and showed that in every case where the countries had nationalised their railways this had been brought about by some set of conditions which could find no parallel in the United Kingdom. Mr. Glossop also discussed the labour side of the question, pointing out, amongst other things, how badly paid and cared for were all the present employees of the State in this country, and also the many dangers which would accompany the nationalisation of our railways.

Mr. Baring was supported by Professor Duncan, who feared that political differences and class pride too largely influenced those who opposed this reform. He appealed to members of the Society to give careful and impartial consideration to the proposal which was designed to aid in the development of agriculture by affording reasonable facilities for the transport of agricultural produce.

Mr. Monckton followed, opposing the motion on the grounds of financial unsoundness. He argued that in countries where the plan had been adopted, although travelling rates might be slightly lower than in England, either the railways had been run at a considerable loss which was eventually borne by the people at large, or else, as in Prussia, the needs and requirements of the people had been absolutely neglected, so that, for instance, the rolling stock had become defective both in numbers and condition, in order that the Government might make a profit. Mr. Monckton also considered the enormous expense which would be incurred by the State in buying up all the English railways, which have now grown to such large dimensions.

Messrs. Patten and Hopkinson also spoke for the motion ; and Messrs. Foster, Brown, Corbett, and Saunders spoke for the opposition.

On being put to the vote, the motion was lost, 5 members voting for it, and 10 against.

On Thursday, 19th March, the Committee arranged a smoking concert, which was held in the Out-Students' common room, at 8.30 p.m. A short programme of vocal and instrumental music was presented, including songs by Messrs. Cope and Farmer and Professors Thain and Pritchard, and a trio by Messrs. Glossop, Patten, and Rayden. Messrs. Kershaw and Efflatoun contributed violin solos, and together played a violin duet, which were all greatly appreciated. Mr. Gibbons very kindly played all the accompaniments, and those present were all most grateful to him for his services. Mr. Samy, at intervals, presented songs by noted singers on his excellent gramaphone. During an interval light refreshments were provided in the dining hall.

FARM NOTES.

There is not much to report as regards the operations carried out on the College Holding this term, as the continuous spell of wet weather experienced since the beginning of February has seriously interfered with the work on the arable land. In consequence the preparations for spring sowing have been delayed beyond their usual date. As soon as the surface is sufficiently dry, however, oats will be sown in No. 11, and this will be followed by the planting of cabbages and potatoes.

It has been decided to carry out experiments with the manuring of oats and mangolds to test the value of the various Nitrogenous manures now on the market, especially the use of Calcium Cyanamide on the limestone soils of the district. The variety trials with potatoes will also be continued.

Lambing has commenced with the small College flock, a good start having been made with six pairs of twins. The ewes were tupped last autumn with a Southdown ram, kindly lent by Lord Bathurst, with the object of testing the value of the Southdown-Oxford cross, and the Southdown-Cheviot cross for the production of fat lambs.

THE COLLEGE ELMS.

The felling on 20th February last of one of the eight old elms, which still remained in the close proximity of the College, calls for a brief comment. For some considerable time past the tree in question, which was one of the four elms standing at the back of the Chapel, had been a serious menace to the safety of that building. This was due to the fact that the tree had not grown upright, and was overhanging the roof to such an extent that those familiar with the erratic behaviour of old elms became anxious lest in shedding one of its heavy limbs or even falling as a whole it might do very extensive damage. On examination this tree proved to be about 170 years old, and the butt, which was quite sound, contained about 150 cubic feet of timber. The great value of the old elms surrounding the College in adding to the picturesque and stately appearance of the building will be denied by no one, and it was with great regret that even one was felled, the more so as it is expected that the new wing which is to be added to the College will entail the loss of another two. It is to be hoped that steps will be immediately taken to replace as far as is possible the loss incurred by the felling of these fine old relics of former generations and that a number of elms and other ornamental trees will be planted in suitable places in the vicinity of the College.

RE-BUILDING AFTER FIRE.

This is in active progress, under the direction of the College Architects, Messrs. Oatley and Lawrence; the contractors being Messrs. G. F. and E. Newcombe. The agriculture and physics classrooms will be greatly improved, and a laboratory for Zoology, Geology, and Veterinary Science will replace the private rooms occupied last term by Messrs. Calderon and Murdoch. An escape staircase for the west wing will be provided, and the floor of the billiard room will be reconstructed of wood blocks on concrete. All this work will be completed by the Long Vacation, or at latest by the Michaelmas Term.

J. R. Ainsworth-Davis.

OBITUARY.

The Earl Cawdor (Hon. Hugh Frederick Vaughan Campbell; R.A.C. 1894-96) died on January 7th, 1914, at a nursing home near Kingston; aged 43. He succeeded to the Earldom in 1911, and leaves a widow with two sons and two daughters.

Mr. Spencer Austen-Leigh (R.A.C. 1853), of Alfriston, Sussex, died on December 9th, 1913. He had been a first class cricketer: he had been in the Harrow eleven, and played for the County of Sussex.

OLD STUDENTS.

Mr. J. A. Arnold-Forster (M.R.A.C. 1912), P.A.S.I., has been appointed Agent to the Estates of the Earl of Malmesbury, of Heron Court, Christchurch, Hants.

SCHOLARSHIPS.

The first scholarship given at the end of last term was awarded to Mr. Alan Stewart Patten, and the second to Mr. Bayard Douglas.

Messrs. J. Douglas, Husain, Farmer, and Ashtana received Honourable Mention for the term's work.

R.A.C. AND V.W.H. POINT-TO-POINT RACES.

Stewards.—The EARL BATHURST, C.M.G., M.F.H., The EARL OF SUFFOLK AND BERKSHIRE, M.H., MR. W. F. FULLER, M.F.H., MR. H. O. LORD, M.F.H., MR. J. ADAMTHWAITE.

Judge.—MR. A. PRICE.

Clerks of the Scales.—MR. W. BLUNSOM and MR. E. V. COPE.

Clerk of the Course.—MR. G. S. LEFEVRE MILDMAY.

Starter.—MAJOR J. H. PURVIS.

V.W.H. Hunt Committee.—MR. J. ADAMTHWAITE, MR. C. C. GOULDSMITH, MR. G. S. LEFEVRE MILDMAY, MR. H. ADAMTHWAITE.

R. A. C. Committee.—MR. R. H. COLES, MR. R. K. SWANWICK, MR. S. E. ASHTON, MR. E. V. COPE, MR. A. S. PATTEN, MR. B. GLOSSOP.

Hon. Secretary and Stakeholder.—MR. R. F. P. MONCKTON.

The Royal Agricultural College and V.W.H. (Earl Bathurst's) point-to-point races took place on Thursday, March 5th, over the old course at Siddington, by kind permission of Messrs. A. Henly, J. A. Attwater, A. Plummer, and J. Gardner, and the popular sporting fixture attracted the usual large crowd. Unfortunately the weather was unfavourable, heavy rain falling throughout the greater part of the afternoon, which of course militated somewhat against the enjoyment of a well organised and otherwise successful gathering. The course, about three miles, is nearly all grass, with the exception of a couple of pieces of plough, with fair hunting fences, and a water jump. A good afternoon's sport was witnessed. There were one or two mishaps. In the light weight race Mr. Rycroft had a fall and dislocated his shoulder. In the interval between this and the next race a young man named Jack Hannaford, of Chesterton, was knocked down by a rider, the horse rolling on him, and he sustained fractured ribs. Luckily there were two or three medical gentlemen present. Mr. Rodd, riding Mr. H. M. Lewis's horse in the heavy weight race, fell and cut his face. With these exceptions, the meeting passed off pleasantly.

As an agreeable preliminary to the afternoon's racing, the R.A.C. Beagles entertained a large number of landowners and farmers over whose land they hunt to luncheon in a tent, the catering being in the experienced hands of Messrs. Viner. The present Master, Mr. R. H. Coles, presided, Mr. L. A. Eckstein, who hunted the Beagles during the first part of the season, having been called to British East Africa on business.—After the toast of the King, Mr. Coles proposed the toast of the landlords and farmers. Having remarked that that duty should have devolved upon Mr. Eckstein, had he unfortunately not had to leave them, the speaker referred to the kindness with which the Beagles were always welcomed, despite any damage they might do. They had had several new meets during the season, which had extended their hunting enormously, and the season had been a great success. He was sorry Earl Bathurst was not able to be at lunch, but they hoped to see him later. (Applause.)

Mr. Walter Cole, in reply, said as long as they had land the tenant farmers would be pleased to see the Beagles over their land. During the time the Beagles had been in existence they had had more sport than many counties in England enjoyed, and what with the V.W.H. and the Beagles they had little time to spare for anything else.

Mr. James Gardner proposed the toast of the Master of the Beagles, Mr. Coles, remarking that he was a good man who had stepped into the breach caused by Mr. Eckstein leaving England.

The toast was cordially honoured, and the Chairman, after responding, proposed the health of the Masters of Foxhounds.

Major W. F. Fuller, M.F.H., in a genial response, said if all people were as fond of foxhunting as they were in that locality, it would last for a good many generations to come. He always appreciated the privilege of accepting the hospitality of the R.A.C. Beagles. Agriculturists were always of a genial and generous disposition, and good sportsmen.

NOMINATION RACE.—For maiden horses hunted with either of the V.W.H., Cotswold, Heythrop, or Duke of Beaufort's Hounds, the property of and to be ridden by subscribers. The winner, a cup, and the sweep not exceeding £20; second to save his stake. Catch weights over 12st.

Major J. H. Purvis's Martial, 6 years	Mr. H. Adamthwaite	1
Mr. G. Lloyd-Jones's Simonstown II., aged	Owner	2
Mr. H. Adamthwaite's The Miner, 6 years	Mr. G. H. Bennett	3
Mr. W. F. Herron's Little Fellow	Owner	0
Mrs. James ns. Mr. J. W. Cobb's Cashel Boy II., aged	Mr. Cobb	0
Mrs. Cuninghame' Gaylad, 6 years	Mr. W. J. Cuninghame	0
Mr. Davy's Dorcas, aged	Mr. Rodd	0
Captain G. W. Liddell's Ruby Ring, aged	Owner	0

Won by three lengths, five lengths between second and third.

V.W.H. (EARL BATHURST'S) HUNT RACE. LIGHT WEIGHT.—For maiden horses hunted with the V.W.H. (Earl Bathurst's) Hounds, the property of and to be ridden by subscribers. Winner, a cup; second to save his stake. Catch weights 12st. or over.

Captain G. W. Liddell's Cerney, aged, 12st. 7lbs.	Owner	1
Major A. B. Cator's Peeping Tom, aged, 12st.	Owner	2
Mr. Lakin's Coolboy, 6 years, 12st.	Major Christie	3

Mr. W. C. Cuninghame's Neerod, 5 years, 12st.	Owner	0
Captain Haslam's Lady Bird, aged, 12st.	Owner	0
Mr. A. H. Rycroft's The Baby IV., 7 years, 12st.	Owner	0
Mr. R. R. Smart's Lady Jane, aged, 12st.	Owner	0
Captain Sopper's Crown Prince, 6 years, 12st.	Mr. C. C. Gouldsmith	0
Mr. H. Adamthwaite's Nancy Joyce, 5 years, 12st.	Owner	0
Mr. G. Lloyd-Jones's Romance IV., aged, 12st.	Mr. G. H. Bennett	0
Mr. G. Lloyd-Jones's Saint's Day, aged, 12st.	Owner	0

Won by fifteen lengths, a length dividing second and third.

College Cup.—For Past and Present Members of the Royal Agricultural College. Sweepstake of £1 each. The winner to take two-thirds of the sweep; the second, one-third. The Old Challenge Cup to go to the winner. The New Challenge Cup, presented by past members, to go to the first present member who completes the course, and who owns his horse. Catch weights over 12st. 7lbs.

Mr. C. Joynson ns. Mr. F. V. Stewards' Earl of Witney, aged, 12st. 7lbs.	Mr. Joynson	1
Mr. W. Heydeman ns. Mr. Selby Lowndes' Rufus, 5 years, 12st. 7 lbs.	Mr. Heydeman	2
Mr. A. P. Slingsby ns. Mr. R. T. Stanyforth's Maude, 6 years, 12st 7lbs.	Mr. Battersby	3
Mr. T. Hartnoll's Tory, aged, 12st. 7lbs.	Owner	0
Mr. Stanhope Rodd ns. Mr. Ponsonby's Lark, aged, 12st. 7lbs.	Mr. Rodd	0
Mr. Spooner's Goldbar, 4 years, 12st. 7lbs.	Owner	0
Mr. H. F. Schall's Bilbah, 5 years, 12st. 7lbs.	Owner	0
Mr. C. M. Hoare's Jackson, aged, 12st. 7lbs.	Owner	0
Mr. S. E. Ashton's Roland, aged, 12st. 7lbs.	Owner	0
Mr. R. Birchenough's Life Buoy, 13st.	Owner	0
Mr. C. E. Pickmere ns. Mr. Hawkins' Butterfly II., aged, 12st. 7lbs.	Mr. Pickmere	0
Mr. R. H. Coles ns. Mr. McPherson's Aeroplane, aged, 12st. 7lbs.	Mr. Coles	0
Mr. G. M. Gibbs' Tango, aged, 12st. 7lbs.	Owner	0
Mr. W. Pepper ns. Mr. McPherson's Ragtime, aged, 12st. 7lbs.	Mr. Pepper	0

Won easily, twenty lengths between second and third. Mr. Ashton came in fourth and won the New Challenge Cup.

Farmers' Race.—For horses hunted with either of the V.W.H. Packs, the property of tenant farmers farming not less than 100 acres within the countries of the above-mentioned hunts, or farmers over whose land the R.A.C. Beagles have hunted. Winner, a Cup and 8 sovs.; second, 2 sovs. Catch weights over 12st. 7lbs.

Mr. A. F. Chillingworth's Holstein, 6 years	Mr. W. Pepper	1
Mr. J. Handy's Misfire, 7 years	Owner	2
Mr. W. H. Whiteman's Shy Boy, 6 years	Owner	3
Mr. E. T. Balch's Starlight, 5 years	Owner	0
Mr. H. Organ's Buckaloo, 6 years	Mr. C. Organ	0

Won by five lengths.

V.W.H. (Earl Bathurst's) Hunt Race (Heavy Weight).—For maiden horses hunted with the V.W.H. (Earl Bathurst's) Hounds, the property of and to be ridden by Subscribers. Winner, a cup; second to save his stake. Catch weights 14st. or over.

Mrs. McClintock's Fair Play III.	Mr. Bennett	1
Mrs. Muntz's Sambo	Mr. H. W. Kemble	2
Captain W. L. Campbell's Bulgar	Owner	3
Captain W. B. Rennie's Sweep	Owner	0
Mr. S. E. Ashton's Rugby	Owner	0
Mr. H. M. Lewis's The Jew	Mr. Rodd	0

Won by a field.

SIDDINGTON CUP.—For horses owned by farmers over whose land the R.A.C. Beagles have hunted during the past two seasons, that have been hunted with either of the V.W.H., Cotswold, or Duke of Beaufort's Hounds, and that have never won a steeplechase. Winner, a cup, added to 8 sovs.; second, 2 sovs. Catch weights over 13st.

Mr. T. R. Lewis' Ragtime, 6 years	Mr. R. H. Coles	1
Mr. P. Sutton's Peter, 6 years	Owner	2
Mr. H. Horton jun.'s Intzlabata, 7 years	Owner	3
Mr. R. K. Hewer's Sloeberry, 8 years	Owner	0
Mr. W. J. Ratcliffe's Bounty, 6 years	Owner	0
Mr. W. J. Ratcliffe's Bounty, 6 years	Mr. Cowley	0
Mr. A. F. Hutchings' Harkaway, 6 years	Mr. W. Spooner	0
Mr. E. Porter's Peter, aged	Mr. W. Pepper	0

A capital finish; won cleverly by a length by the Master of the Beagles.

ATHLETIC SPORTS.

President.—PROFESSOR J. R. AINSWORTH-DAVIS.

Stewards.—PROF. KINCH, PROF. D. TURNER, C. B. SAUNDERS, ESQ., A. D. HOPKINSON, ESQ., G. H. CORBETT, ESQ., R. SWANWICK, ESQ., R. H. COLES, ESQ., A. M. RALLI, ESQ., A. MEYSEY-THOMPSON, ESQ., R. F. B. MONCKTON, ESQ.

Hon. Secretaries.—B. GLOSSOP, ESQ., A. S. PATTEN, ESQ.

Judges.—PROF. DUNCAN, PROF. PRITCHARD, E. B. HAYGARTH, ESQ.

Starter.—PROF. THAIN. *Timekeeper.*—M. KERSHAW, ESQ.

Members of Sports Committee.—PROF. KINCH (Chairman), and MESSRS. R. H. COLES, A. M. RALLI, A. MEYSEY-THOMPSON, B. GLOSSOP, A. S. PATTEN, and M. KERSHAW.

The sports were held on Wednesday and Thursday, March 18th and 19th. On the first day the heats for the 100 yards and bicycle egg and spoon race were run off and the following events decided :—

Long Jump.—1st, Hardial Singh, 18ft.; 2nd, Kunduroff, 17ft. 7in.

Half Mile (Open).—Prizes presented by the Staff.—1st, Coles, 2 min. 23 4-5 secs.; 2nd, Glossop; 3rd, Brewster. This race produced a rather disappointing entry. Coles took the lead at the start and won easily by twenty yards from Glossop. Only three finished.

Throwing the Cricket Ball.—1st, Kunduroff, 91yds. 2ft.; 2nd, Efflatoun, 85yds. 2ft.

Throwing the Hammer.—1st, Kunduroff, 67ft. 4in.; 2nd, Brewster, 63ft. 8in.

Three Mile Race.—First prize presented by Dr. Howard Marshall. The race produced ten starters, but after a few laps only four runners were left. Patten set the pace, but after two laps Floyd took the lead, followed by Coles and Patten, Monckton bringing up the rear. The pace was rather slow, but Floyd and Coles gradually drew ahead. With half a lap to go, Coles took the lead and sprinted home from Floyd an easy winner by 80 yards. 1st, Coles, 18min. 5 secs.; 2nd, Floyd; 3rd, Patten.

The races for Farm Servants and College Servants were also run.

The weather was rather stormy, but better than it threatened to be.

The track was not in such good condition on the Thursday, after the rain. The weather was fine, but cold, with the exception of a hailstorm, which greeted the finish of the two miles walking race. In the afternoon a large number of guests enjoyed the sport, in spite of the cold. Mrs. Ainsworth-Davis entertained the visitors to tea in a marquee erected on the lawn ; the M. & S.W.J.R. Locomotive Works Band was in attendance, under the conductorship of Mr. F. C. Woollard, and played a pleasing selection of music. A beautiful selection of prizes attracted the attention of the guests ; of these the cups presented by Dr. Howard Marshall and Mr. and Mrs. Swanwick and the Staff, and the Principal's prize for the mile, are worthy of special mention. A new challenge cup, for Hard-court Lawn Tennis, presented by Mr. Meysey-Thompson, was also on view and much admired.

The races themselves, especially the quarter mile, half mile, one mile, and three miles, were rather disappointing in that the winner, Coles, was never pressed, and won easily in all four events. Consequently the times were only moderate, with the exception of the quarter mile. In the mile and three miles races, Floyd and Patten, especially the former, ran very well, but were unable to compete against the tremendous sprint and finish of Coles. It is a matter of regret that such important races as the 100 yards, and the mile, do not attract a larger number of entries from the students. Even the handicap races, which events should be keenly contested, produced quite small entries.

The distribution of prizes was kindly undertaken by Mrs. Howard Marshall, to whom Mr. Patten offered the cordial thanks of the students for her kindness and interest in coming to the College to present the prizes. On behalf of the students Mr. Patten also thanked Mr. and Mrs. Swanwick, Dr. Howard Marshall, The Principal, Mrs. Vidal, and the Staff for the beautiful prizes which were given for certain races.

Quarter Mile.—1st, Coles, 58 1-5 secs. ; 2nd, Glossop. Won easily by Coles, the time being quite good considering the state of the track.

Walking Race (2 miles).—First prize presented by Mr and Mrs. Russell Swanwick. 1st, Patten, 19 mins. 34 secs. ; 2nd, Monckton ; 3rd, Rayden. This race produced an unsatisfactory number of starters. Patten won easily, finishing at a tremendous pace as a result of a heavy hailstorm during the last lap.

Putting the Weight.—1st, Harcharan Singh, 29ft. 11½in. ; 2nd, Kunduroff, 28ft. 11in.

100 *Yards* (final).—1st, Perkin, 11 4-5 secs. ; 2nd, Hardial Singh. Perkin won easily by a few yards in rather poor time. The track was very heavy after the rain.

Sack Race.—1st, Shereff ; 2nd, Hawden.

200 *Yards Handicap.*—1st, Rayden, 30 yds, 21 3-5 secs.; 2nd, Glossop, 15 yds.; 3rd, Gazieh, 20 yds. Rayden won easily by ten yards. A closer finish would undoubtedly have resulted had not one of the runners cut across the track, thus putting a number of competitors out of their stride. Coles was scratch man and Rayden had the limit start.

High Jump.—1st, Hardial Singh, 4ft. 9in.; 2nd, Kunduroff. Only H. Singh reached the standard of 4ft. 8in., and afterwards cleared another inch.

Mile Race.—First prize presented by the Principal. 1st, Coles, 5 min. 19 secs.; 2nd, Floyd; 3rd, Patten. Patten set a terrific pace, but could only keep it up for one lap. The second, third, and fourth laps were, as a result, very slow, and Coles won easily by a tremendous sprint at the finish.

Bicycle Egg and Spoon Race.—1st, Brewster; 2nd, Efflatoun. This race produced only a few starters, owing to the limited number of push bicycles in the College. It is to be regretted that students, who do not compete in the other events, do not patronise this race which is held for their benefit.

Hurdle Race.—1st, Perkin, 19 secs.; 2nd, Coles. Perkin won easily. A mishap with one of the hurdles prevented Kunduroff from finishing a good race for second place.

Half-Mile Handicap.—1st, Glossop, 2 min. 20 1-5 secs.; 2nd, Floyd. This race produced eleven starters. Coles, the scratch man, tried hard to make a race of it, but had to pull out at half the distance. Glossop won with the closest finish of the day, from Floyd, who failed to produce a sprint at the finish.

Three-legged Race.—1st, O'Donovan and Rayden; 2nd, Efflatoun and Gazieh.

Tug-of-War.—In-Students v. Out-Students. As a result of two good pulls the In-Students were successful. The Out-Students were a much heavier team, but failed to put their weight to any account.

The Donkey Race, for the R.A.C. Hunt Cup, under Rational Hunt Rules, produced a really close finish, Rayden beating Coles by a short head after Coles had "galloped" up the straight. The costumes were not up to the usual standard, but the prize, presented by Mrs. Vidal, was deservedly won by Monckton, as an "Arabian Knight."

The Three Miles Challenge Cup and the *One Mile Challenge Cup*, which were won by Coles last year, again went to him. He also repeated last year's performance, by taking the *Silver Medal* for the highest number of points in the sports.

The Challenge Cup for Jumping was won by Hardial Singh.

The Challenge Cup for Fives was awarded to Meysey-Thompson and Monckton.

HOCKEY.

Of the ten matches played, three were won, six were lost, and one was drawn, and five of the fixtures were scratched. The play of the team can only be described as being erratic, which may be gathered from a glance at the results of the matches. Dean Close School, for instance, beat us on February 4th by ten goals to nil, whereas on February 25th we beat precisely the same team by four goals to one.

The feature of the season was the somewhat sensational defeat of the S. E. Agricultural College, at Reading. It is true that we had out rather a stronger team than had been available during the term previously, but the result was still rather a surprise.

We have to thank those gentlemen who turned out regularly to practice games, and a special word of thanks is due to Messrs. M. H. O'Donovan, C. R. Roper, S. Peek, Hardial Singh, E. V. Cope, A. S. Patten, A. Perkin, R. H. Prior, C. Llewellin, and R. Snape, for having played in various matches ; and to Messrs. M. Kershaw, R. H. Coles, and C. B. Saunders, for having played in the match against Wye.

CHARACTERS OF THE TEAM.

B. Glossop (Right Half).—Has made a successful captain in every way : particularly in the arranging of practice games and thereby improving considerably the play of the team, the prospects of which were not very bright at the beginning of the season. A hardworking half-back, his tackling being the feature of his play. Rather weak in defence in front of goal.

R. Moses (Centre Half).—Has proved far more successful this year as a half-back than he did last season in the forward line. A most energetic and untiring player. If his capabilities as a half-back had not been discovered in time, our defence would have been very much weaker. Still has to learn his place on the field a little more.

G. R. V. L. Trusted (Goal-keeper).—Has proved to be a most useful "find." He has played excellently throughout the season, and in most matches has had a great deal of work to do.

G. H. Corbett (Inside Right).—Passes well to his wing. An extremely hard worker who comes back to help the halves whenever necessary. Should learn to dribble quicker and to shoot harder and more frequently.

W. Ellis (Outside Right).—A good player who dribbles and centres well. Should come back after the ball when it has been taken away from him, when his half-back is not close behind him.

A. H. R. Phillips (Centre Forward).—Has also played left half. Shoots very well indeed if not pressed by the opposing defence. When passing he must learn to hit the ball sufficiently far in front of the man, especially when passing to the wing.

Harcharan Singh (Left Back).—An invaluable member of the team. Has played well consistently throughout the season, and excelled himself in the Wye match. Hits hard and accurately and tackles admirably.

W. Spooner (Right Back).—Hits and tackles well. Unfortunately he could only play in half of the number of matches. If he had played more regularly he would have learnt his place better. A most useful member of the eleven.

R.A.C. v. Dean Close School.—Played on the Dean Close ground on February 4th in delightful weather. The ground, which is an ideal one, was in perfect condition, and an extremely fast game resulted. The School forwards pressed from the first bully and scored their first goal within the first minute of play ; and within the next ten minutes they had raised their score to 4 goals. The College began to work together more from this point and the ball was taken into the School's circle on many occasions. At half-time the score was 8—0 against the R.A.C. The College had the sun behind them on the resumption of play, and a very evenly contested game was enjoyed all through the second half.

The College forwards had many opportunities of scoring, but somehow they failed to put in any shots at all. The Dean Close forwards, however, lost no opportunities, and scored twice more before the close of play. Final score: Dean Close School, 10 goals; R.A.C., 0. R.A.C. Team: G. R. V. L. Trusted (goal); A. S. Patten, C. R. Roper (backs); C. Llewellin, R. Moses, B. Glossop (half-backs); W. Ellis, A. M. Ralli, A. H. R. Phillips, G. H. Corbett, G. de Coundouroff (forwards).

R.A.C. v. SWINDON H. C.—Played on the College ground on February 7th. Rain fell very heavily, accompanied by a strong wind, during the first half of the game, with the result that water collected in large pools all over the ground. There was one deep pool near the centre of the ground in which the ball was practically lost to view on one or two occasions, and which caused some little trouble at one moment when a bully had to take place in it. Corbett scored a good goal for the College in the first half; and at half-time the score was—R.A.C., 1 goal; Swindon, 1 goal. In the second half Corbett scored again for the College, and it was not until the last minute of play that the Swindon outside right scored the equalising goal. The game was an extremely good one throughout, and the R.A.C. team showed considerable improvement on its performance at Cheltenham, though the forwards were still quite unable to avail themselves of their many opportunities to shoot. Final score: R.A.C., 2 goals; Swindon H. C., 2 goals. R.A.C. Team: G. R. V. L. Trusted (goal); G. de Coundouroff, Harcharan Singh (backs); S. Peek, R. Moses, B. Glossop (half-backs); A. M. Ralli, C. R. Roper, A. H. R. Phillips, G. H. Corbett, W. Ellis (forwards).

R.A.C. v. EAST GLOUCESTERSHIRE.—This match was played at Cheltenham on February 11th. The ground was in very good condition. It was the third match played by the College. From the first the East Gloucestershire forwards pressed into the College "twenty-five," scoring their first goal in the first few minutes. The score at half-time was 7—nil. On resuming play the game became more equal, but the College defence was unable to hold out against the attacks of their opponents. Snape scored the goal for the College just before time. The final score was 14—1. R.A.C. Team: G. R. V. L. Trusted (goal); Harcharan Singh, C. R. Roper (backs); G. de Coundouroff, R. Moses, B. Glossop (half-backs); Hardial Singh, G. Snape, A. H. R. Phillips, G. H. Corbett, and A. M. Ralli (forwards).

R.A.C. v. HERTFORD COLLEGE, OXFORD.—This match was played at Oxford on February 14th. The ground was very soft, rain having fallen all night. The play was very even. The score was opened by one of our backs unfortunately tipping the ball into his own goal. Just before half-time Hertford succeeded in scoring a goal. The score at half-time was 2—nil. During the latter half the College defence fell off, Hertford succeeding in penetrating our defence, and scoring twice more. Harcharan Singh scored a goal for the College a short time before the end of the game. Unfortunately, there were no umpires for the match. The score was 4—1. R.A.C. team: G. R. V. L. Trusted (goal); M. H. O'Donovan and W. Spooner (backs); A. H. R. Phillips, R. Moses, and B. Glossop (half-backs); A. M. Ralli, G. de Coundouroff, Harcharan Singh, G. H. Corbett, and G. Snape (forwards).

R.A.C. v. DEAN CLOSE SCHOOL.—This match was played at Cheltenham on February 25th in fine sunny weather. The School ground was a trifle soft, owing to rain which had fallen in the night. The R.A.C. had opened their season with a match against Dean Close School, and had suffered a bad defeat; but this match showed them at the top of their form, the defence being sound all through. The School forwards opened the attack at once, and for the first few minutes looked dangerous, but the R.A.C. backs soon settled down to hard and accurate hitting. After a certain amount of mid-field play the R.A.C. forwards got away, and Peek opened the scoring. The game then became very fast and Ralli, who had been doing good work on the left wing, ran down and scored. The R.A.C. halves were constantly giving their forwards opportunities, and just before half-time Ellis added a third goal. On resuming the School forwards brought the play more into their opponents' half, but were usually checked before reaching the circle, and seldom were allowed to shoot; but towards the end of the game Dean Close scored with a good shot. In the last minute Corbett ran through cleverly and added a fourth goal to the R.A.C. score. R.A.C., 4; Dean Close, 1. R.A.C. team: G. R. Trusted (goal); Harcharan Singh, W. Spooner (backs); A. H. R. Phillips, R. Moses, B. Glossop (halves); A. M. Ralli, S. Peek, W. Ellis, G. H. Corbett, M. O'Donovan (forwards).

R.A.C. v. East Gloucester A.—Played at Cheltenham on Saturday, February 28th. The College journeyed to Charlton Park to play this match with every hope of success on account of their splendid victory against Dean Close School on the previous Wednesday. The form, however, necessary to win matches was not produced, and the team as a whole was very disappointing. The forwards could not have played much worse, and the defence seemed incapable of giving them but little support. During the first half East Gloucester scored on two occasions, and the College, hoping that it would do better, re-arranged the forward line after the interval. This proved to be a right move, for the College was certainly more frequently dangerous than during the first half. The home team, however, scored two more goals, and the only bright event during this uninteresting game came, just before time, when Corbett, receiving an accurate pass from Glossop, shot into the corner of the net, making the score 4—1 in favour of the home side. No one, with the possible exceptions of Glossop and Spooner, can be singled out as having played a really good game, and taken as a whole the display given by the R.A.C. team was most unsatisfactory. R.A.C. team: G. R. V. L. Trusted (goal); Harcharan Singh, W. Spooner (backs); A. H. R. Phillips, R. Moses, B. Glossop (halves); A. M. Ralli, S. Peek, W. Ellis, G. H. Corbett, M. H. O'Donovan (forwards).

R.A.C. v. Cotswold H.C.—This match was played on the College ground on March 7th, under wet conditions. At the commencement of the game the College forwards had no difficulty in beating the Cotswold backs, and Corbett opened the scoring a few minutes after the bully off; and Phillips added two more goals before the interval. On resuming, the Cotswold Club took up the attack, and scored with a fine shot. A lot of even play now followed, the enemy's goalkeeper saving well on many occasions. Before the close of the game three more goals were added to the College total by H. Singh, Prior, and Ellis respectively, and the Cotswold club increased their score by one. The College defence was quite sound, the right wing being exceptionally good, and it was a treat to see the forwards shooting more frequently. The College was glad of the strong support that it received from the touch line in spite of the drizzling rain which fell throughout the match. R.A.C., 6; Cotswold H.C., 2. R.A.C. team: G. R. Trusted (goal); Harcharan Singh, E. V. Cope (backs); C. R. Roper, R. Moses, B. Glossop (halves); Hardial Singh, R. H. Prior, A. H. R. Phillips, G. H. Corbett, and W. Ellis (forwards).

R.A.C. v. S.E. Agricultural College, Wye.—The annual match against Wye was played on Saturday, March 14th, at Reading, on the University College ground, and resulted in a win for the R.A.C. It was expected to find the ground in an extremely soft condition, owing to the very wet weather which had prevailed during the whole of the week; but although rain fell heavily during the whole of the second half of the match, the ground never became really slippery, and a very fast game was enjoyed. The R.A.C. soon began to press after the bully off, and Kershaw scored within the first five minutes, after some good combination by the forwards. This was the only goal shot during the whole of the match. Play was confined to mid-field during the greater part of this half, the ball only on rare occasions being taken into the circles. Matters became rather serious at one time when two penalty corners were given against the R.A.C. in quick succession, but fortunately the Wye forwards were unable to make good use of these two opportunities. The R.A.C. began to press again after this, and Phillips was unfortunate in hitting the goal post with a hard shot. The Wye forwards made another attack just before half time, and put in a good shot, which, however, was cleverly diverted by Trusted. On the resumption of play, rain began to fall, and it continued to do so for the rest of the afternoon. The play during the second half was very similar to that in the first half of the match, being very evenly contested throughout. On one occasion when the Wye forwards had penetrated into the R.A.C. circle, the goal was in imminent danger, for Trusted, in saving a shot, had slipped on to his knees, but fortunately Harcharan Singh managed to get the ball in time, and cleared it well to the forwards. A few minutes before time Kershaw had the misfortune to put out his knee. It was very fortunate that this did not occur earlier in the game. The final score, one goal to nil, accurately reflects the merits of the two teams, and shows that the game lost none of its interest till the very end, so even was the score. Of the R.A.C. forwards, the two outsides, Ellis and Kershaw, were the best; and the whole of the defence played well. R.A.C. team: G. R. V. L. Trusted (goal); Harcharan Singh and W. Spooner (backs); C. B. Saunders, R. Moses, and B. Glossop (half-backs); M. Kershaw, R. H. Coles, A. H. R.

Phillips, G. H. Corbett, and W. Ellis (forwards).—A special word of thanks is due to the authorities of the Reading College for so kindly allowing the match to be played on their ground, and for providing us with an excellent tea afterwards; and all the members of the eleven were extremely grateful to those gentlemen at Wantage Hall who placed their rooms at the disposal of the team for changing in. We hope very much that we shall be able to carry out the suggestion made after the match, and arrange a hockey fixture with the Reading University College for next season.

R.A.C. v. COTSWOLD H.C.—Played on the Cotswold Club's ground on Wednesday, April 1st. The weather was perfect, and the ground dry and firm in spite of the previous wet weather, but it was rather rough in front of the two goals. There was no score during the first half of the game, but in the second half Corbett put in a good hard shot, which the Cotswold goal-keeper just managed to save. He was unable to clear it in time, though, and Cope put into the net. A short time afterwards Corbett scored the second goal for the R.A.C. with a beautiful hard shot. There was no further score; but the College should have shot many more goals. They were attacking for most part of the game, and the Cotswold forwards rarely entered the R.A.C. circle. Shooting, however, was difficult owing to the roughness of the ground. Score: R. A. College, 2 goals; Cotswold H.C, 0. R.A.C. team: G. R. V. L. Trusted (goal); Harcharan Singh and C. R. Roper (backs); C. B. Saunders, R. Moses, and B. Glossop (half backs); Hardial Singh, E. V. Cope, A. H. R. Phillips, G. H. Corbett, and W. Ellis (forwards).

GOLF.

The Senior and Junior Cups were played for on Wednesday, March 25th, with the following results. During the afternoon a heavy rainstorm came on. This affected the scores, especially of the late starters.

SENIOR CUP (6 starters).

Name.	*Gross.*	*Handicap.*	*Net.*
C. B. Saunders	85	8	77*
W. Ellis	91	6	85
G. R. Verel	100	10	90
Hardial Singh	100	9	91

* Winner of cup.

JUNIOR CUP (12 starters).

F. R. Calderon	106	25	81*
C. Hawdon	108	23	85
R. F. P. Monckton	110	23	87
C. R. Roper	102	14	88
H. D. Elkington	103	14	89

* Winner of cup.

During the course of the term three other competitions were held. The results were as follows:—

CONTINUOUS 9-HOLE STROKE COMPETITION.

96 cards taken out during the fortnight.

1st, A. M. Ralli	40	2½	37½
2nd, A. D. Hopkinson	45	6½	38½

CONTINUOUS 9-HOLE BOGEY COMPETITION.

46 Cards taken out during the fortnight.

1st, A. L. D. Perkin	2 up.
2nd, W. Ellis	all square.

In this competition Perkin returned a score of 36 for the 9 holes. This is a record for the present course.

HANDICAP FOURSOMES.

1st, H. D. Elkington and C. B. Saunders.
2nd, W. Ellis and J. W. Farmer.

R.A.C. BEAGLES.

Owing to Mr. L. A. Eckstein being called away suddenly to British East Africa, Mr. R. H. Coles took over the Mastership.

December 10th, Mr. W. Cole's, Wiggold. Excellent scent. Hounds hunted very well. Killed three hares, all after good hunts.

December 13th, Greyhound Inn, Siddington. Had several hunts, but lost all our hares in Jefferies' nurseries.

December 17th, Mr. R. T. Hewer's, Marston Meysey. Scent good. Found a hare and had a very good hunt of 1½ hours and killed in the open. Had a good hunt later, but had to whip off.

January 3rd, Mr. W. Ractliffe's, Preston. Good scent. Good hunt of over an hour and killed. Then found a very strong hare near the Cricklade Road. She ran straight over the Churn, then later on over the Canal and another stream, and was finally lost at Dry Leaze.

January 10th, Mr. R. Swanwick's, R.A.C. Farm. Started with a good hunt and lost. Then found again in No. 16A, and after a short but very fast hunt ran into our hare.

January 15th, Mr. W. B. Blunsom's. Very bad scent indeed. Fair hunt in the afternoon.

January 28th, Mr. W. T. Stevens', Ranbury, Poulton. Good day. Found a hare almost immediately, and after a short circle ran straight away past Charlham nearly to Driffield cross roads, where we had to whip off owing to too many hares. We then found a hare below Poulton Priory, and after a ringing hunt, lost in the Priory grounds. Scent very good.

January 29th, Mr. Cave's, Lowesmoor. Scent very good, but too many hares about. After two or three short hunts, we got away on a hare and ran over the valley by Cherington pool, then back up to The Peaches, where we had bad luck in changing hares, and ran back on a fresh hare and could do nothing more.

February 4th, Messrs. Cole's, Ashbrook. Found a great many hares to start with, but eventually got away on a hare and ran through Ampney Knowle and round behind Ampney Ridings, and eventually lost in Moorhill Corner. Scent fair.

February 7th, Mr. Gardner's, Chesterton. Very wet day and cold wind. Scent hopeless. Found several hares, but failed to kill. We had the misfortune to have one puppy run over by a train.

February 11th, Mr. D. Davy's, Maisey Hampton. Scent very good. Found a hare at the back of the house, but soon lost. After a long time we found another by Marston Hill Farm, and ran very fast back over the Fairford Road right away to Honeycomb Leaze Copse, then back for two fields, where we had the misfortune to change hares.

February 14th, Mr. J. D. Crewdson's, Syde. Found at once at the back of the house, and ran straight up to Ostrich Wood, where we gave our hare a great hustling, but she eventually made off up the hill, and we changed hares by The Clump, and we never again looked like killing, there being hares in all directions. We eventually finished up at Cowley Woods.

February 18th, Mr. W. Cole's, Wiggold. Scent fair. Found too many hares, but had several good hunts, but failed to kill.

February 21st, Colonel Calley's, Burderop Park, Swindon. Found too many hares, but eventually got away and ran straight to Ogbourne, where we changed hares on the Downs. Scent was good, but it was extremely heavy "going."

February 25th, Mr. S. Dennis's, Latton. Scent good. Had a good run of 40 minutes, and killed our hare at the end in Mr. Gibbs's garden at Down Ampney. This was the twenty-third kill of this season, which beats all previous records. We then found another hare, and ran very fast straight to Duke's Brake, where we lost.

February 28th, Mr. J. A. Attwater's, Dry Leaze. Found a hare at the back of the farm and ran into Jefferies' Nurseries, out again on the same side, then up over the hill and back to the Canal at Siddington, where the hare crossed the Canal several times, and after giving her a tremendous hustling she went straight away, and we lost her on Mr. Gardner's farm at Chesterton, after 2½ hours. This was an excellent hunt, and hounds were unlucky not to kill.

March 4th, Mr. Horton's, Eisey. We started off with an excellent hunt of 1½ hours, very fast indeed. The hare got up on the field just over the canal and ran nearly to Latton Lock, then right-handed nearly to Latton, and then back to where she was found, where she squatted and got up in front of hounds and ran past Alex Farm, over the canal up to the bank of the Thames, then left-handed up to Marston Meysey bridge, and then back down the towing path to Eisey Field Copse, where scent gradually failed. We later found several other hares but failed to kill.

March 7th, Mr. Hopkinson's, Duntisbourne. Started by finding a hare and losing immediately. After some trouble we found again by the Grove, and ran up past the Rectory Farm to the Syde Road, then back again past Winstone, and after two or three small circles, put up our hare again in the field where she was started, and hounds raced her for ten minutes and caught her after an excellent hunt of 1¾ hours.

March 11th, Mrs. Cooper's, Bibury Court. Scent fair. Had several short hunts but failed to kill.

March 14th (to finish the season), R. A. College. Very cold, rainy day. Scent very poor. Found two hares, both of which ran into Oakley Park, where we had to whip off.

R. Monckton, First Whip.

We heartily congratulate Messrs. Eckstein and Coles on a record season during which 24 hares were killed in 41 hunting days. Our best thanks are due to all who have so kindly allowed us to hunt over their land, and who have on so many occasions hospitably entertained us.

LAWN TENNIS.

The Hard Court has been properly fenced round, and has provided many good games of tennis, together with two matches, though the first match was abandoned through rain. The second provided most enjoyable tennis. Messrs. Meysey-Thompson and Efflatoun winning after an evenly contested first set against Messrs. Swanwick and Perkins, the score being 6—4; 6—1.

Mr. A. Meysey-Thompson has very kindly presented a Challenge Cup for Lawn Tennis on the asphalt court, to be competed for each Spring Term.

FIVES.

The Challenge Cup was won by Mr. A. Meysey-Thompson (stroke) and Mr. R. F. P. Monckton (bow), who defeated Messrs. R. H. Coles (stroke) and C. Hawdon (bow); the score being 15—8; 15—3. It is hoped that Messrs. Meysey-Thompson and Coles will be able to render a good account of themselves in a match against Cheltenham College projected for the end of the term.

CROSS COUNTRY RACE.

The annual steeplechase over a course twice round the College Farm, approximately five miles, took place on Friday, December 12th, 1913. There were five starters: those who completed the first round were Coles, Floyd, Patten, and Monckton. Time 16½ minutes. In the second round Patten and then Monckton fell out; Coles winning from Floyd by about 20 yards. Time, 36 minutes nearly, the going being heavy and sticky. Professor Kinch acted as starter and judge, and Mr. L. A. Eckstein as arbitrator, riding round with the competitors.

CORRESPONDENCE FROM CEYLON.

To the Editor of the Agricultural Students' Gazette.

Dear Sir,—It has been suggested to me to write a short article on prospects in Ceylon for R.A.C. Students, so I will now endeavour to write one that may be of some help to intending planters.

Tea and Rubber Planting, Ceylon.

Creepers.—This is the term applied to men who come out to learn planting, and their occupation is called *Creeping.* A creeper has, as a rule, to pay a premium of, say, £100, and £5 a month for his board and lodging. The length of time taken creeping depends on several things.

1.—The kind of man to whom the creeper comes out. There are many men who go in for creeper-mongering, who will take the premium and in one or two months shove the creeper into some rotten billet, with no experience : my advice is to creep at least six to seven months before taking up a billet.

2.—A man who wishes to get on out here must, however much he likes the man whom he is under, worry his life out to get introductions to firms in Colombo, and also ask heaps of sensible questions with regard to the work.

3.—A creeper must be prepared to do as he is told, and must not expect to go off the estate every week to enjoy himself, or most likely he will be disappointed when he arrives in Ceylon ; and if people know he goes about a lot they will not be so keen to give him a billet when the time comes.

4.—The greatest thing for a creeper to learn is the lingo of the country, and how to keep his temper with one of the most annoying of people he is likely to meet, the estate cooly.

5.—The management of labour is the hardest item to learn, and a good grasp of this should be aimed at before taking a billet.

I should like to warn men intending to come out that the competition out in Ceylon is very great, sometimes as many as 60 applicants for a small billet, and there are dozens of men out of billets, but if men will work hard and always act straight, there is no reason why they should ever want work. The usual pay after creeping six months is £120 a year, with two allowances, which means a kitchen cooly and a garden cooly. Some firms will pay a man's passage home in five to six years, but at present it is rather the exception. When a man gets his first billet and until he has full charge of a place he is called an S. D. (sinna dorie, or small master), and the superintendent above him is called a P. D. (peria dorie, or big master). If a man is lucky he ought to manage to draw from £15 to £20 a month in say three to three and a half years from the time he leaves England, but on the other hand there are many men who work hard for even five or six years, and are not earning more than £10 to £12 a month. The men who get on best out in Ceylon are those who have the most push about them, but they must know when to make that push. A bachelor, if he is careful, can live on £10 a month, but that will not mean luxury by any means. A married S. D. ought to manage his household expenses on about £14 to £15 a month with care. Many men live on less, but the usual result is that they break down in health in doing so. A bungalow is supplied, with a certain amount of furniture. As regards climate, most tea estates above 2,500ft. are healthy ; rubber estates are usually rather feverish, but there are many men who have lived in the low country for twenty years or more who have hardly ever been ill, but they are men who know how to look after their health and don't run risks. The living in low country is cheaper, and the salaries higher, this is mostly due to the risky climates. Rubber is grown at an elevation up to 3,000 feet, and tea runs up to anything over 6,000 feet. The usual hours on a tea estate are from 6 a.m. to 5 p.m.

If this is found of any interest for your readers, I shall be glad to write a further one, *re* the work on a tea estate, and also on a rubber estate. Also I shall be glad to give any information intending planters may require if they care to write to me.

Yours faithfully,
Douglas Gilmour.

Moneragalla, Pussellawa.

REVIEWS.

THE FLORA OF CIRENCESTER AND ITS NEIGHBOURHOOD. By W. J. Greenwood. Standard Printing Works, Cirencester. pp. 27. 6d.

This is a paper, not a catalogue, read before the Cirencester Naturalists' and Archaeologists' Club in January, 1914: it is by an expert in knowledge of the local flora, and contains most interesting notes. It should be in the hands of all interested in our native Cotteswold flowering plants.

THE RURAL PROBLEM. By Henry D. Harben. London: Constable and Co., Limited. 1913. 2s. 6d. net.

This little book is in reality the Report of a Committee of the Fabian Society appointed to inquire into Land Problems and Rural Development and report to the Society. Mr. Harben was Chairman of this Committee. The information collected will prove useful, possibly especially to the Committee itself, though in some particulars too scanty, *e g.*, in connection with rent per acre in different localities. With the conclusions drawn and policy recommended naturally opinions will differ, and the Committee itself was not quite unanimous on the Minimum Wage policy. A Bibliography, prepared by Miss G. Westbrook, of the subject, confined almost entirely to modern books and publications, will prove of value.

THE NEW AGRARIANISM. By Charles W. Dahlinger. G. P. Putnam's Sons, New York and London. The Knickerbocker Press. 1913. pp. v. and 249. 4s. net.

The sub-title of this book is "A Survey of the Prevalent Spirit of Social Unrest, and a Consideration of the Consequent Campaign for the Adjustment of Agriculture with Industry and Commerce." Clearly as the density of the population of the United States increases, and the proportion of her people and capital which is engaged in manufactures becomes greater than that employed in agriculture, the agrarian conditions become more and more similar to those in England, Germany, and other European countries. The author has notes and comments on the agricultural methods and land reforms of some European countries and indicates how some of these may help to direct the course of improvement of American agriculture.

COMMON COLICS OF THE HORSE. By H. Caulton Reeks, F.R.C.V.S. Third Edition. Balliere, Tindall and Cox. pp. 362 and xvi.; with 32 illustrations.

The appearance of a third edition of Mr. Reeks' book indicates appreciation by the Veterinary profession, for whom it is intended. The various conditions included under the name of colic are probably responsible for more anxiety, loss, and death, than any other single group; there is therefore ample warrant for devoting a special work to this group; and Mr. Reeks is well qualified by his long experience to produce it. The book originally excited much comment owing to the fact that the author abandoned some long cherished ideas on the treatment of colic and advocated new methods. One can hardly doubt now the soundness of his general plea. The exhibition of large doses of sedative drugs, especially in the initial stages of colic, which Mr. Reeks deprecates, masks the symptoms, and closes the door on the chief source of information available to the Veterinary Surgeon, which would enable him to arrive at a diagnosis, as well as being otherwise contra-indicated. In the third edition the book has been considerably enlarged. It contains a fund of valuable information, and we recommend its careful perusal to all veterinary practitioners.

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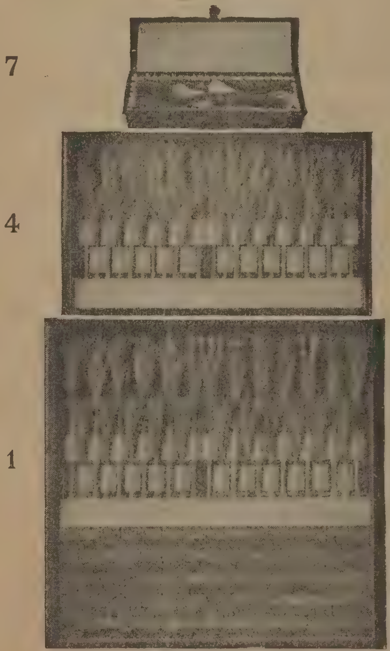

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Title Page and Index to
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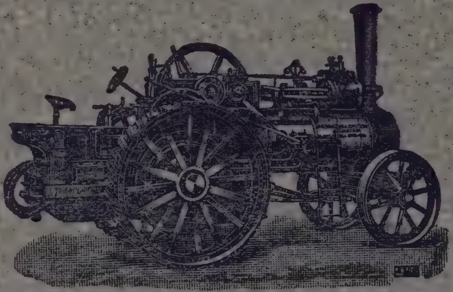

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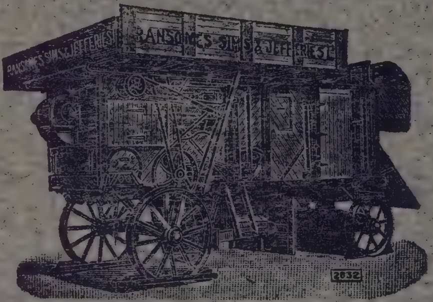

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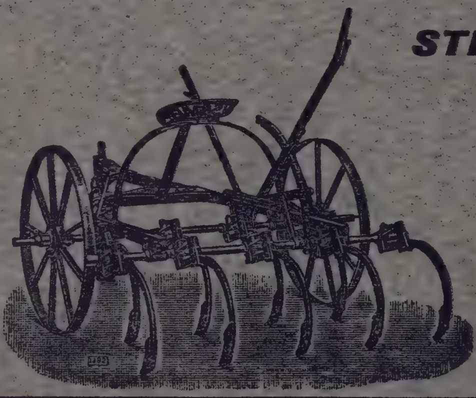

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AGRICULTURAL STUDENTS' GAZETTE.

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NEW SERIES.

Agricultural Students' Gazette.

Vol. XVII. JULY, 1914. No. 1.

EDITORIAL.

The general meeting of the Students' Club, at the beginning of this term, expressed a desire that the Committee of Management should appoint a sub-committee to consider whether any alterations might not be made in the "Agricultural Students' Gazette" with the object of rendering it of greater interest to both past and present members of the College.

A sub-committee consisting of the Principal, A. D. Hopkinson, Esq. (representative of the Staff), A. S. Patten, Esq. (representative of the In-Students), S. S. Husain, Esq. (representative of the Out-Students), Professor Blundell (representative of past members of the Students' Club), and Professor Kinch and B. Glossop, Esq. (representatives of the "Gazette"), was consequently appointed, and inquired fully into the matter. The interests of both past and present Students and members of the Staff were duly considered, and we hope that the appointment of the Committee will be justified by its results.

In the present issue of the "Gazette" we have included a rather wider range of subjects than usual, with the hope that all subscribers to the periodical may be able to find in it something of interest to them.

The new cover should help to brighten up the appearance of the magazine, and we are indebted to Professor Duncan for taking much trouble in getting out the final design, for which a new block will be prepared.

Students are reminded that the subscription to the "Gazette" is only 3s. per annum, and it is hoped that in future all those leaving the College will agree to continue as subscribers.

The Editor.

KING EDWARD'S WING.

The sum of £4,147 has so far been given or promised, and the quantities are being worked out for a first contract. It is anticipated that the foundation stone will be laid in November. Old Students and other friends of the College who have not yet contributed to the Building Fund are earnestly requested to help in raising the £853 necessary to complete the first £5,000 and so secure the same amount from the Development Fund.

J. R. A.-D.

THIRD SUBSCRIPTION LIST.

Already acknowledged (corrected total), £4,062 8s. 4d.; A. Brassey, Esq. (in addition to £25 in second list), £50; Right Hon. Lord Desborough and Hon. E. Pierrepont, £5 each; J. C. Hollins, Esq., M.R.A.C., Messrs. Gillett and Co., and Messrs. Wakefield and Son, £3 3s. each; J. J. German, Esq. (Old Student), J. Poore, Esq., M.R.A.C., H. Pullan, Esq., and J. Ripley, Esq., £2 2s. each; T. S. Bath, Esq., (Old Student), W. M. Gibson, Esq. (Old Student), Dr. McGregor (Old Student), J. P. Millington, Esq., G. Bernard Wilson, Esq., M.R.A.C., and Anonymous, £1 1s. each; A. P. Slingsby, Esq., M.R.A.C., £1; total, £4,147 11s. 4d.

M.R.A.C. (Member of the Royal Agricultural College)—Honours Diploma of Membership.

REBUILDING AFTER FIRE.

The restored part of the College will be ready for use next term. Great improvements have been effected in the Agriculture and Physics class-rooms, and by abolishing the private rooms on the second floor it has been found possible to secure a really good laboratory for the departments of Veterinary Science and Zoology. The new arrangements include a fireproof staircase, accessible by emergency doors from the first floor and second floor corridors of the West Wing.

J. R. A.-D.

REFLECTIONS ON BIG GAME SHOOTING.

Deer stalking in the British Isles is and always has been the sport of the few, but sport with rifle and spear in the larger lands over the seas is every year being sought by greater numbers of young Englishmen. One result of these conditions is that however well grounded in other sports men may have been in their youth, they " enter " to big game rather as tyros. A few considerations before they start may make a lot of difference to themselves and to the game.

Hundreds of men, who, if they have ever thought of big game at all have looked upon it as a vanishing quantity only to be come at by lavish expenditure of money, must almost every year, now, suddenly find it knocking at their very doors, for, especially owing to the opening up of Africa, farming operations of all kinds are now being carried on in the heart of the continent, and in what a few years ago were the almost inaccessible haunts of the magnificent African fauna. " My chief difficulty is with the vermin," a friend of mine who is cattle farming in Northern Rhodesia told me the other day, and when I asked how on earth vermin could interfere with cattle I found he was alluding to lions and leopards. Now undoubtedly lions, elephants, rhino, and such other destructive beasts are " vermin " to the farmer, but buck, and in many countries stags, are a great asset in filling in the sporting requirements, and incidentally the stomachs, of men leading somewhat isolated lives ; in fact as a soldier I know many outposts of the Empire where life would have been almost unendurable to me without the game, but where, with it, one's spare time was one continuous round of interest and excitement.

I think then I need not further argue the point that such an asset to the soldier, farmer, administrator, whatever he may be, ought to be assured of fair and decent treatment just as much as a fox or a salmon at home.

Game laws are now almost universal, but they do not nearly cover all the points involved, for example, a certain number of some kind of buck or stag are allowed to be killed yearly, a greater proportion being rightly allowed to the settler than the wandering soldier or sportsman ; but what about the numbers that are wounded and not bagged ? (No limit can unfortunately be set to the number fired at.) And this brings me to the one and only point I can touch on in this short article. *Never fire a long shot.* The whole sport lies in getting as close as possible to your quarry. One still reads in books written by globe-trotters, perhaps they would style themselves sportsmen, accounts of how they " browned " herds of game with their modern rifles and perhaps got one or two ; ignoring the many that they may have wounded and left to have a miserable existence ended by a pack of wild dogs or a skulking hyena, but there can be no satisfaction to any thinking man in this.

You can walk up to many herds to within 300 to 400 yards often, and pump lead at them, but the fun is to spot your good buck, the leader of the " harem," and try to outwit him so as to get a shot within 100 yards that will drop him in his tracks. Or again with heavy buck, some Indian stags, the Para for example, you can gallop after them, separate the desired one from the herd, and ride him to bay, when a rifle or spear will finish a bit of sport that you feel some satisfaction in having accomplished.

It may be amusing on a rifle range to see what damage you can do at 800 yards, but forget all about that when after game and see how close you can get whether by stalking or by the extra four legs you may have underneath you.

Even when stalking, in fairly rideable country it is a good thing to have a horse and a hog-spear handy behind. You may hit a buck so as to hardly disable him and the second barrel at a galloping beast will very likely miscarry, and under these conditions I have had some splendid gallops, riding down and spearing my game which otherwise would have escaped *me*. I say " me," as it must be remembered that game is hunted from the cradle to the grave by carnivora, and any slightly disabled one is not likely to exist very long ; as for the carnivora, they can kill quite enough without our help.

For dangerous game I more than ever recommend the close shot. A crippled lion or tiger that escapes is more than likely to find he can't catch antelope, and he then turns a man-eater and haunts native villages. Also for your own personal safety I think it dangerous to wound. A hungry lion will attack a man or men if he thinks they are unprepared, but they very quickly appreciate the fact if *you* are hunting *them*, and unless cornered or wounded will seldom do more than an attempt at intimidation ; a short rush and much roaring and lashing of the tail. I once fired at and killed one at just over 50 yards, but generally they let me walk up to about the length of a cricket pitch, when I used to sit down and put in a fatally crippling shot. This was in the Somali country at a time when they hadn't been much hunted, and I think they didn't understand anything not running away from them and were trying to puzzle out what sort of fight this very daring new kind of monkey was going to put up when they got the bullet. I think this holds good almost everywhere still, and applies to most dangerous game, though certainly elephants in some of the Uganda country bordering on the Lado enclave have grown much more dangerous of late years and now charge on very little provocation—or none at all; this probably being again due to their tempers having been soured by misplaced bullets.

Wounding a beast that can hit back may have either of two results, he may be down on you in a whirlwind, and this, perhaps, is the lesser danger; or he may retire into thick bush, where, if for no other reason than that of not caring to show the white feather before native followers you must perforce follow him, and where, when you come on him, probably very suddenly, you may be sure that there will be no more delay but that it will be your life or his in a few seconds.

I therefore advocate the closest shot possible for Pachyderms and Carnivora as well as for stags, buck, goat, etc., but for totally opposite reasons.

Many wanderings have taught me that the former will in time have to go. Sentimentalists in arm chairs at home like to think of herds of mighty elephants roaming the jungles and deplore unlimited slaughter of the noble king of beasts, but then they have never awakened to find that a herd has passed through the orchard in the night uprooting every tree, or that a troop of lions have attacked the stable and eaten the horses, and will probably be round again in a night or two with increased appetites. At the same time I did get rather a shock once in a very wild part of Africa which isolated Englishmen were trying to tame and cultivate. I had been told that a certain farmer had killed more lions than anyone else, and was an authority on the matter, so I sought him out and asked for particulars. He was a modest and silent man, and his only answer was " Strychnine."

There need be little fear but that there will be plenty of the larger carnivora to be dealt with for some generations to come, as proclaim them as vermin, and deal with them how you will, they always seem to breed up to the limit of the food supply, and there is no doubt, I think, that they have largely increased in the game preserves, not intended for them at all, which have been established of late years in at least three continents.

Finally, to sum up, if you go after big game make up your mind to take any trouble to make sure of killing and not maiming, and of not being killed yourself; neither of the latter two being any sport at all; and don't always be guided by men who ought to know, as someone who has never been properly "grounded" in "shikar" may live years in a game country and never know any better. I remember going out after some springbok during the South African war with a Colonial irregular horseman, I think he thought I had never seen a buck and when we sighted a herd he scouted my idea of a careful stalk, said "Oh, we are used to long shots in this country and never bother to get near them." In spite of my remonstrances he blazed away three or four shots, scattered the herd without, I'm glad to say, touching anything as far as I could see, and then started after one portion of the herd, while I, very glad to be rid of him, followed the other. Although the buck were rather wild after their scaring, I was back in camp in about an hour with a nice buck; he returned late with nothing at all, saying his sights had got damaged! And yet he was really a fairly large farmer in a game district, and not a clerk or a store-keeper.

One more story *apropos* of South Africa. A friend of mine, an Australian, was camped near Johannesburg. He arrived late one night, and next morning, a misty one, he strolled a little way out of camp, carrying a rifle, as he was in an enemy's country. What was his surprise to suddenly see a Zebra loom up in the mist. Of course, he knew there were lots of game in Africa, but so close to Johannesburg! However, food was scarce, and he floored the beast. Going back to camp for help to get the meat in he almost fell over an Eland, which he also promptly bagged. Camp was moved again that evening, and I think they put the great feed they had down to Providence. Strangely enough, after the war I found myself on a ship with him going to the Cape, and he told this almost incredible story—"Then it was *you*, was it? That was my brother's private Zoo," exclaimed a lady who had been listening to him.

B. R. M. GLOSSOP.

A YEAR'S WORK ON A SOUTH AFRICAN FARM.

As I have been asked to write something for the *Students' Gazette*, I have decided to try to give you a brief account of a year's work on a farm in the Western Province of Cape Colony. I have chosen a farm on which the chief crop grown is the grain crop, with crops of fruit and vines, also green fodder grown as sidelines.

The farming year in this district may be said to commence about the beginning of April, when the winter rains start. As soon as the ground is softened by the first rain, the ploughs are set to work to plough in the grain. The seeding operations are very simple, as the seed is just sown broadcast over the land and ploughed in and harrowed. It receives no further attention till the crop is ripe for harvesting, except that the bushes must be picked up and removed.

The grain is sown on either what are known as "old lands," *i.e.*, land that has been sown the previous season, or on "braak" lands, this is land that has been ploughed the winter before and left fallow through the summer. This "braak" land may be either old land that has been resting idle or new land that has just been broken up for the first time. If the "bush" is very thick on this new land before ploughing it is broken down by dragging the "Sleepblok" over it before ploughing. The "sleepblok" is just a couple of old railway metals joined together side by side and pulled by a span of mules.

The ploughing season is one of the busiest times of the year, as one has to be hard at work all the time to get the work done before the rains are over and the land dry and hard again. The teams are on the land and at work all day till sunset, with an interval of half an hour for breakfast and an hour for dinner. Some farmers prefer to work right on from morning till about three o'clock in the afternoon, then outspan without a stop for dinner except just a few minutes. The teams are fed and harnessed while it is still dark, so as to be at work by daylight. On moonlight mornings they start work about four, so as to get a longer day. The teams consist of spans of six or eight mules or horses for the single furrow ploughs, which are only used for "braaking." The other ploughing is done with double or three furrow ploughs, with teams of eight or ten animals. Each plough requires a man to hold the plough and drive, also a boy to lead the team, as no reins are used. After the planting is finished, the ploughs go on " braaking " land for the next season as long as the ground remains soft enough.

After all the ploughing is done the farmer has time to attend to his other crops. The orchards and vineyards will require to be ploughed and cultivated. The ground must be cleaned of the weeds that have grown up during the winter, and the soil well stirred and loosened so as to retain the moisture through the dry summer months. If there are any new trees or vines to be planted, now is the time to get the land ready for them, as the fruit trees must be planted in July or August and the vines about September. This land would have been " subsoiled " with dynamite in the summer while it was dry and hard so as to loosen the soil to a good depth.

The pruning of the trees and vines will be done now while they are dormant, then the spraying will have to be done when the blossom opens, and continued at intervals as the different varieties require it till the fruit is ripe. The oranges, if any are grown, will be ripe about July. Crops of green fodder such as mealies (maize) may be planted in August and cut two or three months later. Lucerne may also be put in at this time in districts where it will grow, and where there is plenty of water for irrigating it.

By the time all these odd jobs are done summer will be on, and a start must be made with the harvesting. Towards the end of November the grain will be fit for cutting : the first to ripen is the barley, then the oats and wheat. The reaping is done with the self-binder, or in cases where there is a very large area of wheat the crop may be harvested with a harvester of the " Sunshine Harvester " type, such as is used in Australia. This machine just strips the ears off, leaving the straw standing. The ears on passing through the machine are thrashed and the clean wheat falls into a bin. The straw is got rid of by turning the stock on to it to eat it off and tread it down, so that it may be ploughed in.

Where the self-binder is used, it is the custom to leave all the sheaves lying on the ground till all the cutting is finished. Then the sheaves are collected into heaps of about fifty, and left a week or so before carting to the stack. The stacks are often of considerable size, sometimes as many as two or three hundred loads are put in one stack. The largest stack I ever saw contained five hundred loads of wheat.

Some farmers let their men do the carting at whatever time of the day or night they please, provided they bring in a certain number of loads. It is usual for the greater part of the carting to be done at night and the early morning, the men working often most of the night when it is moonlight. In this way the heat of the day is avoided, and also the grain is less liable to shake out than when handled in the heat of the day. Not much trouble is taken over the building of the stacks, as they have only to stand a week or two till the thrashing machine comes round.

The thrashing is done as soon as possible after harvest, and the grain sold at once, as very few farms have the necessary accommodation for storage. While thrashing the men work from sunrise to sunset, the hours being from about 5.30 a.m. till 7.30, with half an hour for breakfast and an hour for dinner, also short stops of about five minutes at ten and four for wine. The straw is all cut up into chaff before it leaves the machine, and all the real chaff and cavings are mixed in with it. For the purpose of making chaff, all the machines are fitted with a straw "bruiser," which is a pair of drums fitted with knives and pegs revolving in a pair of concaves fitted in a like manner. The chaff is stacked in a heap outside and used for feeding and bedding purposes.

After the thrashing is finished comes the slack time of the year for the grain farmer, unless he has other crops such as fruit to attend to. In this case he will have the marketing of the fruit to do. The fruit starts ripening in November, and lasts till March. The early peaches and the apricots come first, then the other varieties of peaches, plums, apples, pears, etc. The fruit, if of first class quality, may be exported or sold in the local markets. Some prefer to sell their whole crop to the jam factories, and so the labour of sorting and grading is saved. Others dry the fruit or send it to one of the co-operative dried fruit companies, who will take the whole crop at a given rate and at the end of the year the farmer gets his share of the profits, while the grapes are either made into wine and brandy or raisins at home, or are sent to a co-operative winery.

By the time these odd jobs are done it will be time to see about getting ready for the ploughing season again, and so the year's work starts again.

You will notice that I have made no mention of livestock other than horses and mules. This is because there are as a rule no cattle or sheep kept on a grain farm, as farms suited to grain growing are not usually well suited to the rearing of livestock. Also as much of the land as possible is put under cultivation. A few pigs are sometimes kept to run over the stubble to pick up the fallen grain.

It may be as well in conclusion to say a few words about labour and wages. The farm labourers are of course coloured men, or "boys" as they are usually called. These men have to be superintended by white men or the farmer himself. The average wage paid to these coloured "boys" is 2s. 6d. per diem, or ninepence to one shilling per day and their food. The latter arrangement is the usual one where the farm is some way from a village. A young white man can be got to oversee the "boys" for four pounds a month and his board and lodging. The hours on a farm are from sunrise to sunset, with the exceptions mentioned before, and no overtime. Saturdays, or Saturday afternoons at least, are holidays except in the busy seasons.

T. DOUGLAS, M.R.A.C.

THE SPECTACLES.

By FRANK SAVILE, M.R.A.C.

Mother said she would be gone shopping for at least an hour, and we were to look after Father, and keep ourselves clean in case callers came, and not go near the pond, and not bother cook with questions, and wipe our feet if we had to go upstairs, but most truly and particularly to look after Father.

Father is so learned, you see, that he had no time to look after himself.

He writes books and little squidgy things which aren't quite books and yet aren't quite tracts either, and are called pamfletts—only I'm not absolutely sure you spell it that way. And he walks around and around the garden after lunch for exercise, and never leaves off muttering all the time, and used to read only the doctor forbids it or he'll go blind and gurgles and makes upside-down sort of motions in the air—Father, I mean, not the doctor—and doesn't look where he's going. So Lancelot and I have to be *very* careful of him.

Lancelot is ten and goes to school next month and then the whole responsybillyty will come on me, because its' no sort of use expecting any help from the twins, who are six and ingrowsed in their own concerns which are prinsippally mud pies.

Last Thursday Lance and I thought we saw a blackbird fly out of the yew bush at the far end of the tennis lawn and ran to look if there was a nest and only turned our backs for *half* a minnit and Father tramped on like a moing machine over the new bed of bulbs by the pergola and did dammage that Cox, our gardener, says five bob won't go near to pay the half of. And Mother was exseedingly cross and said it seemed as if we couldn't be trusted a moment away from her eye.

I cried, but Lance said he knew no other boys who had to lead a father on a string and suffer in their own development through losing so much time over domestick problems beyond their ears.

He'd got that out of Father's own pamfletts—a bit that Sarah left in the grate after lighting the study fire—because Lance is really smart and reads and reads and reads, and makes Mother sy and hope he won't go the way of his poor parent and that time she gave him a good smacking for cheek. And it *was* cheek, if you come to think of it, Father being there all the time. But he puffed out his lips and looked helplessly at Mother and half an hour later gave Lance sixpence silently on the stairs and we bought bullseyes.

So now you understand how *very* careful we have to be.

As we watched Father we discussed the situashin. Lance said it was quite time the twins faced the hardships of their lott and that he could not bare to go away from me, feeling that I was fiting the great battle of life alone. It sounded so heroic that I felt a sort of creepy glow all over and sobbed. Lance said to dry up and confrunt the facts.

"Look at those twins!" he said. "There's Winkie, rolling down that bank and getting up and rolling down it again and again and again till it makes one's head go round. What useful service to hewmanitty is she doing? and John George? He's throwing blobs of mud at the beehive. He's not only useless but harmful, for one of them might stick on the entrance and keep the bees in or out, and I jolly well wish they'd sting him! He needs to learn his dewty to the commewnitty."

Just then Father, who'd been walking with his brows nitted and his eyes cast down suddenly lifted his chin and beat his hands together and cried out excitedly that he'd got it!

That meant he'd got the better of an argewment with somebody who wasn't there but who'd written a book against one of father's books or pamfletts. And he was so pleased—Father was—that he strutted right off the path and stamped on a couple of begonias before we could yell to stop and mind what he was about. I think he thought he'd got the other argewer under his foot, he put it down so very stampily. Then he looked at us and at the garden and at the remaynes of the begonia as if he'd fallen out of a cart.

"Dear! Dear! Dear!" I heard him mutter to himself. "This is most distressing—very distressing indeed!"

We cleared away the begonia before Cox should come and patted down the mold and led Father away to the other end of the lawn before we loosed him. But having exploded that once and got the shock about the begonia he didn't get lost in his inside again, but draggled up and down the path quite soberly, looking at us with a sort of fritened cock of the eye, though he might have known we shouldn't sneek—espeshally after the sixpence—and Lance wondered whether it wouldn't be the best beginning of John George's life work to be accused of it and have to suffer for his Father, but I said fare was fare.

Then we heard the postman's nock.

The seccond post is generally so unintresting that Lance and I did not do more than start for the letters but allowed Winkie to win in the race for the frunt door which she thought we were running only we weren't. But when she came back waving one we saw we had made a mistake. For it was from Aunt Emily.

Aunt Emily's house is a perfect parrydise. There is a barn generally full of hay or straw in some farm buildings close by, and a moor beyond, and wild raspberries growing quite close, and a pine wood below, and a hazel copse not far away, and alltogether the sort of place where one *must* play at Indians or desert iland because everything *shouts* at you to, and Aunt Emily is a topping sort of Aunt.

She asks Lance and me to stay with her for a fortnite at a time about twice a year, and we hadn't been for months so we just skipped up and down to know what was in that letter. Father does a fereful amount of dammage at home while we're away, but Lance says all pleshure is bought at the price of suffering, and it can't be helped, tho' once when we stayed three weeks Cox gave notiss and Mother telegraffed we must come back at once.

Father looked at the letter and muttered, turning it this way and that while we hollered round him to open it, and then said he hadn't got his specs. He can't see a word without them.

Then of course we ran like winking for the house, leaving Father in the middle of the lawn, and I took the studdy and Lance the drawing room and the twins scuttled around generally falling over us and each other and everything else they could, and Tiptop, the spanniell, who isn't really allowed in the house at all but nipps in on the quiet when everyboddy's out and gets in frunt of the studdy fire heard us coming and burst for the door and got between John George's legs and carried him half way down the passage, bumping most thumpily before they got disintangled, and John George yelled and belloed like a little bull as cook said and gave him a bit of bread and butter with brown sugar on it to stop his noise.

And some of the sugar got spilt on the wooden Tyrolese chair that noboddy uses except old General Cockshott when he comes to call and likes to sit very uprite and he did it next Munday and sat by the fire and the sugar got so sticky the chair came up with him when he reeched for his teacup and he said the chair was a damp piece of trumpery and dropped the cup *and* sawcer.

But with all our throing things about we couldn't find the specs even on the top of the bookcase where I slipped on the steps and caught at the shelves to save myself and brought down twenty dixshunaries and cook said she thought there was an earthquake.

By that time Lance had pretty well done the drawing room and we took the dining room together, and Parkins hadn't cleared away lunch yet so we had to look under the cloth, because Father's as likely as not to lift it up if he gets exsited and stuff his specs underneath.

The specs weren't there, only Paul the Pershun cat was below the table, and being the sort of cat that's only just given up being a kitten thought we were dangling the table cloth for her to play with and made a spring at it and clawed my hand through the cloth and fritened me into the middle of next week. And we both tumbled down together with a water bottle and four plates and the bread because the table was so rumpled by the tug we gave it.

And Paul squeeled and burst for the door just as Parkins came in to see what the hullabaloo was about and Parkins gave a kick at Paul as he past and mist and sat down so very hevvily on the matt that I think some of the prikkles of the matting must have run into him as he said such funny things and rubbed himself so and got such a brillyent cullor like a tomarto and really quite shouted at us which wasn't his proper place at all as we told him.

So as it appeered that the specs weren't in the dining room there only remayned Father's own room or possibly Mother's because he's apt to mistake the door sometimes and wanders in and looks round for his boots and once tried to put on a pare of Mother's before she followed him and screemed that he was stretching them beyond repare tho' he'd only got two toes in and was looking at them with a sort of wondering expreshun and scratching his head.

So we took the dressing room first and the very moment we went in tumbled over what's called a lecksicun which had been left on the flore and Lance fell with his forehead against the washandstand, and raised a bump like a plum, and said it didn't matter tho' I wanted to rub it with soft sope of which Father had collected five pots all nearly full to clene his hands from the greese he collects when Professor Hogg the great chemist calls with new invenshuns, which he does nearly twice a week, and Father revells in them and gets *covered* with oil and is sent upstairs to clene himself. And seeing five pots and wanting one badly myself I put one outside the door then and there, so's I shouldn't forget that I wanted to try it on coffee stains on one of my evening frocks which I hadn't told Mother about because I dropped it over myself when Lance and I were hooking sugar off the tray in the passage on our way to bed.

And then the twins must needs come scrimmidging up after us and crawl under the wardrobe just to see if they could, and John George stuck and nothing we could do would buddge him and he roard and roard again and Parkins and cook met on the threshold to know what was the matter and cook put her foot in the soft sope.

How it was I'm sure I can't say but she let her feet travell from under her and take her over the top of the stairs and bump her step after step all the way down to the next landing hollering and clucking like an old hen and Parkins running and making plucks at her which mist every time till she stopped and caught him by the ankles and would have brought him down too only he clutched at the wall and nocked off a lamp brakkett nale and all.

All this time John George was riggling and riggling and swelling himself up and getting stuckier and stuckier, and Winkie in her excitement had got him by the hair, and I had a leg, and Lance both his arms and pulled as hard as any one could till Parkins left cook, who was still lamenting, and came and lifted the wardrobe about an inch and John George came out like a cork from a bottle and let us all go back with a crash against the dressing table and brought down all the collar boxes and brushes. And then Parkins took us all out of the room and locked the door and said go back into the garden again before we'd rewined the hole establishment and committed murder and he hoped the Mistress would send us all to bed and keep us there as soon as she got back.

And naturally we didn't want to come, not having searched the dressing room properly and Mother's room not at all, and Parkins insisted. And cook was growling like a cat and helped and took the twins and Parkins us and we all fought and shouted at the top of our voices and as we got down into the hall the door opened and in came —Mother!

She just *looked* at us.

There was Parkins, with his collar all bent, and his fingers bleeding where the lamp brakkett had cut it and the mat dust on his shirt frunt, and cook, with her skirt torn and panting and holding her hand upon her hart, and Winkie sopping wet, because a good deal of the contents of the water bottle had fallen on her in the dining room, and John George with his eyes still as big as sawcers and opening and shutting his mouth like a fish at the fish mungers, and Lance with the bump on his forehead swelling and turning pinky blue, and me crying and all of us *covered* with dirt and soft sope—so Mother just groaned and sank down into a chair.

" What is it ? " she asked faintly. " Is it madness—or the house on fire—or—or—*what* ? "

Then we all shouted at the tops of our voices—

" Father's specs ! "

Just as we did it there was a shuffling noise and Father came in from the garden by the back way and stood in the middle of us rubbing his nose and boiling out his eyes at us like oisters.

Mother looked at *him.*

" It's *your* spectacles that are missing ? " she asked in a queer sort of strangled sort of voice. " *You* set the children hunting for them ?"

Father looked at her a little fritened, a little wondering, but quite conscious of where he was and what he was doing, and sure for once in a way of both the question and the answer.

" Yes ! " he said quickly. " Certainly, my dear, certainly. There was a letter to be read—a letter from your sister Emily."

Mother gave another groan.

Then she stood up and leaned towards Father and lifted his hat and pushed his spectacles down from the top of his forehead on to the bridge of his nose.

SOME METHODS OF ENGLISH FARMING WHICH ARE APPLICABLE TO INDIAN AGRICULTURE.

Although the methods of cultivation and raising of crops differ with difference in soil, climate, and the needs of a country, still there are certain principles which can be applied to almost all soils.

Generally speaking, every soil can be improved in its physical and chemical efficiency by some means or other, but in this paper only those means of improvement will be mentioned which are likely to pay in India.

(1) Storage of Grain.

The method of storing grain is very unsatisfactory in India, and causes great loss to the farmer, who generally keeps his own seeds for sowing purposes. It is quite common to see tons of grain so badly infected by weevils as to be quite unfit for sowing, and if it is sold for consumption it fetches a low price.

By storing in a cool and dry place and subjecting the infected grain to the vapours of bisulphide of carbon the weevils can be killed and this loss avoided at little expense. The vapours of bisulphide being heavier than air permeate the grain and kill the weevils without affecting the food value or the germinating capacity of the grain. The treatment is continued for about 24 hours, and a pound and a half of bisulphide will do for a ton of grain (a ton equals about 27 maunds 9 sers).

(2) " Pickling " of Seeds.

" Pickling " of seeds is steeping seed in a solution of copper sulphate in order to get a coating of the sulphate on the seeds. It is a common practice in England, and it can be usefully adopted by the Indian farmer to reduce the ravages caused by " smut " and other diseases.

(3) Green Manuring.

The practice of green manuring, or the growing of some quick growing crop like mustard, vetches, etc., and ploughing it in in a green state should be much more encouraged. It not only makes the plant food more available, but also has a very beneficial effect in improving the physical properties of a soil. When selecting a crop for green manuring preference should be given to a leguminous plant, like sunn (*Crotolaria*) which will also enrich the soil with nitrogen, the most costly ingredient in soil. The practice is particularly useful for light sandy soils, which require humus to increase their retentive powers. Lately some concessions have been made by the Madras Government in favour of green manuring, and it is hoped that the Government of other provinces will follow its noble example.

(4) Conservation of Farm-yard Manure.

At present the general manure, and in most cases the only manure, at the disposal of the Indian farmer is farm-yard manure, consisting chiefly of the solid excreta of cattle, sometimes mixed with that of horses also. The liquid manure which contains about double as much nitrogen as the solid is altogether lost. This loss can be avoided to a great extent by the liberal use of litter, *e.g.*, straw, hay, leaves, sawdust, etc. The use of litter will also increase the amount of organic matter which on its decay will contribute to a certain amount of plant food, but is much more important in improving the texture and water-holding capacity of a soil.

Generally the dung is taken every day from the cattle shed and made into a heap. The heap becomes hot and dry very soon, and fermentations set in, which may lead to the loss of nitrogen in different forms, as ammonium carbonate and free nitrogen.

Another source of waste is from washing by rain and even the English farmer has not devised any very practicable method for reducing this waste. A great proportion of soluble plant food which could readily be assimilated by the crops is lost in this way. If the manure were stored in a covered pit, with its bottom and sides lined with puddled clay this loss would be avoided to a great extent.

There is another common practice in India, especially in villages, of using dried dung for fuel, which means a great loss of the floating capital of a soil. This practice should be condemned, especially at those places where there are plenty of other materials which can be used as fuel.

(5) Poultry Farming

is very limited in India, but where circumstances allow, it can be profitably carried on as an adjunct to the main farming.

(6) LIMING.

Recent researches have proved it beyond any doubt that lime is necessary in keeping up the condition of a soil. Liming opens hard stiff clays (*usar*), the barren patches of which are scattered all over India. It makes them workable and improves their mechanical texture. It serves as a cement to loose and sandy soils, and improves their retentive properties. It reacts against the acidity of humic soils, and causes the decomposition of organic matter. There are many other advantages like killing of some of the weeds and insects and other pests, but short space does not allow going into details. In certain parts of India because of its absence in mineral form as a carbonate, on the one hand, and the scanty means of communication on the other, it can only be had at a great cost. But where it can easily be got it should be used for improving the soil.

A word of caution is here necessary. At some places limestone in its mineral form as carbonate of lime is intimately mixed with magnesium carbonate, and its use in such a state may be injurious for some crops, especially cereals which cannot tolerate more than a certain proportion of magnesia in a soil.

(8) MIXING OF SOILS.

The adding of clay to sand, and sand to clay soils, may lead to great improvement of a permanent character. This involves great expense, and is not practiced to an appreciable extent at present in England. But where circumstances allow it can be profitably carried on in India, for example, when land is excavated, or where ponds or pools are dug, the earth from them if useful may be spread on the fields.

(9) FALLOWING.

Fallowing, which is practised in India according to different systems of growing crops, should be more extensively adopted. The land lying in fallow should be ploughed deep.

(10) IMPLEMENTS.

The implements for the cultivating and harvesting of crops are very primitive indeed in India, and they want great improvement.

(i.) The ancient plough with a share and a long wooden pole should be replaced by one of steel made on sound mechanical principles. The common English plough which inverts the soil will be particularly useful in ploughing fallows and in preparing seed beds for wheat. Where possible the hand hoe, called *Khurpi* (a blade of iron with a wooden handle), and the *Saravan* (a flat wooden piece for crushing clods of earth), should give way to the cattle hoe, and stone or even wooden rollers respectively.

(ii.) Sowing in drills should be more encouraged, for it distributes an even growth of crops. It also helps the cleaning operations, particularly in relation to root crops.

Most of the English methods of improving the condition of the soil require a great outlay of capital. The Indian farmer, because of his rather insecure condition of tenancy and other economic conditions, is wanting in capital, and so cannot carry on these improvements by himself. To meet this difficulty a system of co-operation should be started somewhat on the following lines.

The unit of such a scheme of co-operation should be a little society formed in every village or group of villages. Every farmer ought to be a member and contribute to it according to the extent of his farm. These units should be grouped again and form a higher society, in order to keep the groups in touch with one another.

The objects of such a society will differ according to the circumstances and the needs of the farmers of the district, but broadly speaking they will be something of the following nature :—

(1) To supply pure and disease resisting seeds.

(2) To keep bulls, rams, and stallions of standard local breeds, to be used by members for breeding purposes.

(3) To advance money at a low rate of interest for purely agricultural purposes.

(4) To buy useful machinery, which an individual farmer cannot afford to keep, *e.g.*, drills, sugar pressing and sugar refining machines, oil-pressing machines, etc., and to lend it on hire to the members.

I am indebted to Mr. B. L. Ashtana for many useful suggestions.

S. S. Husain.

EXPERIMENTS ON PERMANENT GRASS LAND, 1914.

Field No. 13.

Experiments were continued on the 20 plots, each $\frac{1}{20}$ acre, used the last twenty-three years or more (see *Agricultural Students' Gazette*, April, 1889, August, 1889 and 1890, December, 1891, August, 1892, 1893, and 1894, July, 1895, August, 1896 to 1903, December, 1904, and

August, 1905 to 1913), the manures applied to each plot being the same in kind and in amount as in the previous years, excepting that on A_3 and B_3 the manure was withheld since 1911.

The manures and their amounts per acre are given below.

This is the twenty-seventh year in succession for the application of the same manures to plots 1—14, the twenty-sixth year of the farm-yard manure plots, and the twenty-third year of the application of Thomas' basic slag.

The farm-yard manure, 12 tons per acre, was applied early in January; the basic slag, 10 cwt. per acre, and kainite, 5 cwt., on January 20th; the superphosphate, 5 cwt., on February 18th; the guano, 5 cwt., on March 25th; the ammonium sulphate, 2 cwt., and the sodium nitrate, 2½ cwt. per acre, on April 14th, 1914.

The guano, Peruvian, contained combined nitrogen 9·8 per cent., equivalent to ammonia 11·9 per cent., phosphates 23·6 per cent., and potash about 2·3 per cent.

The superphosphate contained 26·2 per cent. of "soluble" phosphate.

The kainite contained 12·1 per cent. of potash (K_2O).

The sodium nitrate, and the ammonium sulphate were of good commercial purity.

The basic slag contained phosphates equivalent to 38·5 per cent. of tricalcic phosphate.

The grass was cut on June 8th, and the hay weighed on June 15th: ·94 inch of rain fell on the 9th and ·65 inch on the 11th, but the hay was harvested in very good condition.

The yield of plots, calculated to amounts per acre, was as follows:

		Per acre. cwt.	Excess over Unmanured plot. cwt.
A3.	Rape meal (for 20 years to 1911) ...	15·9	·6
A2.	Thomas' basic slag	21·2	5·9
A1.	Farm-yard manure	31·2	15·9
1.	Sodium nitrate	20·0	4·7
2.	Kainite	11·0	—
3.	Guano	23·7	8·4
4.	Superphosphate and ammonium sulphate	23·0	7·7
5.	Kainite and superphosphate	20·3	5·2
6.	Kainite, superphosphate, and sodium nitrate	28·2	12·9
7.	Unmanured	15·3	—

8.	Kainite, superphosphate, and ammonium sulphate	26·0	10·7
9.	Ammonium sulphate	20·0	4·7
10.	Kainite and sodium nitrate	25·0	9·7
11.	Kainite and ammonium sulphate ...	22·5	7·2
12.	Guano	29·6	14·6
13.	Superphosphate	14·3	—
14.	Superphosphate and sodium nitrate ...	26·4	11·1
B1.	Farm-yard manure	34·8	19·5
B2.	Thomas' basic slag	20·5	5·2
A3.	Rape meal (for 20 years to 1911) ...	19·8	4·5

Some of the meteorological observations during the first half of the year are given below :—

	Rain. Inches.	Rainy days.	Average Rainfall, 40 years.	Mean temp. F°	Days of frost on grass.
January ...	·72	11	2·52	37°2	20
February ...	3·70	20	2·27	42°2	6
March ...	4·03	24	2·01	42°9	9
April ...	1·24	10	1·97	50°4	5
May ...	1·49	12	2·08	53°4	5
June to 8th	·59	2			
	11·77	79			

The low rainfall in April, May, and the early part of June accounts for the smallness of the crop.

The highest yields were given by the farm-yard manure plots, the yield being more than double that of the unmanured. The guano plots on the deeper soil gave nearly 30 cwt. of hay per acre, and the plots with potash, phosphate and nitrogen 26 to 28 cwt. The plots with kainite alone and with superphosphate alone gave less yield than the unmanured plot, but where both potash and phosphates are applied the increase was 5 cwt. of hay over the unmanured, and the hay was particularly rich in *Leguminosæ*. Generally the plots receiving nitrate of soda with other manures have, this year, done rather better than the corresponding plots receiving their nitrogen in the form of sulphate of ammonia.

The mean yield per acre of all the plots was 22·4 cwt., being about 5 cwt. less than the mean of the whole time of the experiments.

Half an acre of the field, near these plots, was divided into 5 plots of $\frac{1}{10}$ acre each. All received potassic superphosphate at 3 cwt. per acre, one plot received nothing further, others received dressings of nitrogenous manures containing combined nitrogen at the rate of 18 lbs. per acre, on May 12th.

Nitrolim or calcium cyanamide gave rather less hay than the plot with no added nitrogen, but the aftermath showed the effect of the nitrolim, as well as of the other nitrogenous manures. The other results were :—

No nitrogen	... ...	25	cwt. hay per acre.
Nitrate of soda, 18 lbs.	N per acre	27	ditto
Nitrate of lime,	ditto	27	ditto
Sulphate of ammonia,	ditto	26	ditto

After hay harvest the whole field was grazed with cows..

E. K.

COTTESWOLD NATURALISTS' FIELD CLUB.

The Principal of the R.A.C. is this year President of this Club, and at his invitation a meeting of its members was held at Cirencester on the afternoon of June 20th. The party met in the Market Place, and under the guidance of Mr. E. C. Sewell went first to the Church, then through the Abbey Grounds to the Norman Archway, through Spitalgate, and to the Roman pavement at the Barton. Here Mr. St. Clair Baddeley kindly gave from his stores of knowledge on Roman life and art in England. Cirencester House was then visited and its wealth of paintings viewed. Thence the party walked through the grounds to the R.A.C., where they were guests of the Principal at tea. Afterwards they inspected parts of the College and its surroundings, the greatest interest being taken in the Botanic Garden, which furnished many grateful specimens. Before leaving Cirencester the visitors went to the Rajah of Sarawak's Museum at Chesterton, and to the " City Bank " or Roman Wall. A most instructive and enjoyable afternoon.

FORESTRY EXCURSION.

On Thursday, 25th June, the forestry students visited the woods on Captain Dorrington's Lypiatt Park estate, near Brimscombe. Mr. Armitage, M.R.A.C., agent for the proprietor, kindly arranged for the party to be shown over the woodlands. " New Larch Plantations," the first wood visited, proved to be an interesting plantation of Larch and Beech, 22 years old, in which the Larch were mostly diseased, some to such an extent that they were practically dead. The Beech had also suffered considerably from rabbits, and there were signs of quite recent damage on a number of the trees, showing that they were by no means safe at the age of twenty-two. After discussing the future treatment it was agreed that it would probably be most profitable to continue the wood for another twenty years and then clear fell, as there was not sufficient Beech on the ground to form a crop or even at present to keep down a considerable growth of grass and brambles.

The next wood visited, "Catswood," presented conditions of particular interest. Here was found on a steep bank with a northerly exposure a crop of Larch about 50 years old, under which was a very good natural seeding of Beech which must have resulted from a good seed year some 16 years ago when the old Beeches on the upper part of the slope had supplied a good deal of mast just as the soil and light conditions were of such a nature as to induce natural regeneration. From a rough calculation it appeared that there were about 250 to 300 Larch per acre, averaging about 7 cubic feet (q. g. under bark) each, or some 2,000 in all. The Larch were tall well grown trees, but the increment borer proved that as regards diameter growth they were no longer profitable to keep standing, and the conclusion come to was that the Larch should be cut out and the Beech allowed to form a crop.

After lunch a very fine wood of 179 years old Beech was visited. Very little thinning appeared to have been carried out and in consequence some of the trees were small and of small girth considering their age, but the wood as a whole was an extremely good example of Beech High Forest. Through the wood were some truly magnificent examples of the manner in which Beech grows upon a typical Cotswold soil—4-5 inches of mould over oolitic brash which gradually merges into solid rock. For a uniform growth of tall, clean, cylindrically-stemmed trees the wood is probably unexcelled in the district. A part which was recently felled gave a return of £250 per acre, which is equivalent to about 5,000 cubic feet of timber.

On the way home the Bourne Saw Mills, Brimscombe, were inspected by the kind permission of Mr. Philpotts. Here the process of converting Beech timber into the numerous different articles for which it is used was seen. The best timber is largely sawn into sizes suitable for all kinds of brush backs, anything in fact from a small nail brush to a large broom. Besides these, rods for walking-sticks, chair rails, pen-holders, and knitting pins are produced in considerable quantities to meet the demands of the factories which manufacture these articles. Out of the poorer qualities of wood such articles as spinning tops and handles for toy spades and hammers are largely produced. The utilization of coppice to manufacture a great variety of small turned articles proved to be quite an important part of the works, and it was interesting to see the many uses to which even quite small Hazel can be profitably put when worked up on the lathe.

A. D. H.

EXCURSION TO THE FOREST OF DEAN.

A tour through the Forest of Dean formed the second Forestry excursion of this summer term. Under the guidance of Mr. C. O. Hanson a very profitable day was spent on the 2nd July in visiting a few of the most important woods in the Forest.

The Experimental Plots in Abbotswood were first inspected, and it was interesting to compare the development of the plots with those in the College Forest Garden as both were formed about the same time. Perhaps the most striking feature of all was the different rate of growth of the two varieties of Douglas Fir. The plot containing the Colorado or Blue variety compared very poorly with that formed of the Pacific or Green variety. The former contained many blanks and the average height of the trees after ten years growth was only 2ft. 2in., whereas the latter plot had a very excellent appearance, the trees being much taller, averaging 6ft. in height for the same period, and having a much healthier and more vigorous growth.

The next stop was made at Bradley Hill to walk through and examine the Oak wood, which was planted in 1872, a mixture of Oak and Larch, but out of which all the Larch were cut by four thinnings which occurred during the period 1887-97. Last winter the wood was again thinned, some Oak and a few odd conifers being removed, and underplanted with Beech. A full planting was not necessary, owing to the numerous natural Beech which had sprung up all through the wood from seed off a few old pollarded Beech, and about 600—700 plants per acre proved sufficient. The present state of the wood gives every reason to suppose that in time it will become a very fine example of Oak High Forest, as the majority of the stems now upon the ground are tall, straight, and with well developed boles. The amount of timber in the wood was measured recently, and it was found to contain about 300 trees per acre, averaging 46 feet in height, and 5¼ cubic feet (quarter-girth) in content. The finances of the wood showed that it had already paid its way, this being due to the value of the Larch thinnings taken out, clearly demonstrating the great value from a financial point of view of a mixture of Larch amongst Hardwoods in a district where small Larch meet with a ready sale.

Passing through the wood and over the ridge a good view was obtained of the natural regeneration of Oak in Blakeney Wood. The history of this wood is sufficiently interesting to be related as it is one of the few examples where a successful sylvicultural operation is accomplished more by chance than design. In 1900 the wood, which consisted of Oak some 100 or more years old, and numbering about 40 to the acre, was enclosed, and in the winter about half the Oaks were felled. As it so happened, it was a very prolific seed year, and in the operations of cutting and hauling the mast was well worked into the ground with the result that in a few years it became apparent that a good natural regeneration had been accomplished over an area of no less than 300 acres. The remaining standards were gradually removed, and now the area carries a good crop of young Oak eight or ten feet high.

Braceland, in the High Meadow Woods, was reached after lunch, and here some of the finest Oaks of the district were seen in a wood of Oak standards and Beech coppice. Further on a rather complex mixture of Oak standards, young Larch, and coppice of various kinds was seen, and the difficult problem of its future treatment discussed. In this wood, as elsewhere, a number of trees were seen which had suffered by being struck by lightning during the severe storm on the previous day.

On the return journey the recently erected Government Wood Distillation Works at Speech House Road were visited, and the process of converting almost valueless cordwood into charcoal, tar, acetone, and naphtha was seen.

A. D. H.

SAMPLE OF CIRENCESTER WATERWORKS WATER TAKEN MAY, 1913.

	Grains per gallon.
Total Solid residue dried at 160°C.	20·94

DETERMINATIONS IN THE RESIDUE.

Silica, oxides of iron manganese...	·30
Lime (CaO)	9·10
Magnesia (MgO)	·72
Soda (with a little potash) (Na_2O)	·84
Sulphur trioxide (SO_3)	1·95
Carbon dioxide (CO_2)	6·77
Nitrogen pentoxide (N_2O_5)	·67
Chlorine (Cl_2)	·83
	21·18
Deduct oxygen equivalent to chlorine ...	·19
	20·99

The chlorine is equivalent to 1·37 grains of sodium chloride per gallon.

The nitrates to ·91 grains of magnesium nitrate or to 1·06 grains of sodium nitrate.

The carbonates to 15·40 grains of calcium carbonate.

The sulphates to 3·4 grains of calcium sulphate or to 2·94 grains of magnesium sulphate ($MgSO_4$)

The temporary hardness was found to be 15°·4 (grains of $CaCO_3$ per gallon) and the permanent hardness 2°·5.

This is very similar indeed to a sample taken in April, 1882, from the Cotteswold Brewery well, of which the present well is a deepening.

During 1912-1913 the amount of total solids dried at 100°C in the town supply has varied between 21·28 and 22·4, the chlorides (as sodium chloride) from 1·29—1·43, nitrogen (as nitrates) 2·1—2·78 per million, the free and saline ammonia almost always absent to trace and albuminoid ammonia ·01—·05, usually under ·03 per million.

COLLEGE NOTES.

Mr. A. S. Patten passed the first part of the examination for the National Diploma of Agriculture held at Leeds in the Spring.

Mr. G. H. Corbett has been offered and accepted a Carnegie Travelling Studentship for the period of one year to go to the United States of America to study the entomological methods of the Universities and of the Department of Agriculture at the various experimental stations throughout America.

TASMANIA.—On June 18th, the Hon. Sir John McCall, M.D., Agent General for Tasmania in London, formerly Minister of Agriculture in Tasmania and President of the Central Board of Health, gave an interesting address and conversation on Tasmania to the members of the College, in the lecture theatre. Sir John, of course, knows his subject thoroughly and told us of Tasmania not only as health resort and play ground for Australia, but in relation specially to fruit growing and the dairy industry, and spoke of its prospects in high terms. He invited discussion, answered many questions, and is always ready to give information and advice to those inquiring about or likely to go to Tasmania.

An old Gold Medallist of the R.A.C., Mr. A. H. Benson, is Director of Agriculture in Tasmania.

FARM NOTES.

SHEEP-SHEARING COMPETITION.—The shearing competition was held on June 11th, with the following results, viz. :—*Prize* : Monkton. *Highly Commended* : Coles, Rayden, and Sirry. *Commended* : Ashtana, Hawdon, Hissey, Husain, Lambhate, Johri, Nandan.

At the Newmarket Bloodstock Sales of Yearlings on July 2nd, Mr. Russell Swanwick obtained the following prices : for a bay colt by Bayardo—Dame d'Or, 3,000 guineas (Sir William Cooke) ; a chestnut colt by Santry—Golden Dawn, 1,200 guineas (Mr. William Singer) ; a brown colt by Chaucer—Tiber, 1,000 guineas (Colonel Story) ; and a chestnut colt by St. Victrix—Perugia, 260 guineas. Mr. Bruce Swanwick also sold a colt by Troutbeck—Trevi foı 700 guineas to Mr. W. Robinson.

COLLEGE HOLDING.—The wet weather experienced at the commencement of the year, followed immediately afterwards by the dry spell, was distinctly unfavourable for getting the crops in on the Experimental Field. The oats particularly have suffered in this direction, and owing to the late date of sowing have suffered to a greater or less extent from frit fly and tulip root. The mangolds, also, germinated rather irregularly, but now, after the late rains, are giving promise of a good crop. The potatoes, including the plots of varieties, notwithstanding their late date of setting, are looking well and making rapid growth. The trial plots of rye and rye mixed with vetches, planted last autumn, turned out a great success, and afforded a welcome supply of green food for the dairy herd before the grass had made a proper start in the spring.

Experiments are being conducted this year with calcium cyanamide in comparison with other nitrogenous manures as a dressing for oats, cabbages and potatoes. Plots have also been set out on mangolds, seeds, and oats to test the value of Professor Bottomley's Bacterised Peat, as a top dressing, in quantities of 1, 2, and 4 ounces to the square yard respectively. The cheviot ewes, purchased in the autumn and put to a Southdown ram, all lambed down towards the end of last term. The ewes and lambs were sold together in the June market, making satisfactory prices.

OFFICERS' TRAINING CORPS.

The contingent took part in a field day at Cheltenham in connection with Cheltenham College O.T.C. Inspection. A very instructive day was spent.

The Contingent fired the Annual Course of Musketry on the Stroud Range during the present term. The best shots of the Recruits and Trained Cadets were Cadet J. Douglas and Cadet Hook respectively.

Sergeant Corbett and Cadet C. R. Roper fired the Classification Practices as for the Regular Army.

Corporal R. J. Hissey was promoted to the rank of Sergeant from July 25th, 1914.

The Annual Camp takes place on Salisbury Plain (Windmill Hill) from July 25th to August 8th.

One of the oldest members of the Corps leaves this term in Sergeant G. H. Corbett. As senior cadet N.C.O. he has done much to rouse the enthusiasm of the Corps, and we shall all feel his absence from camp this year.

DEDICATION OF MEMORIAL BRASSES IN THE COLLEGE CHAPEL.

A service was held in the College Chapel on Friday, July 3rd, when brasses were dedicated to the memory of four old students from the Royal Agricultural College. The inscriptions on the brasses were as follows :—

> " In Memory of Raymond Cripps, of Cirencester, one of the founders of the Royal Agricultural College. Born 1810. Died Feb. 6, 1852."

> " In memory of Allen Alexander 6th Earl Bathurst, M.P. for Cirencester from 1857 to 1878, who assisted in upholding the interests of this College by his generous aid and support. Born October 19th, 1832. Died August 2nd, 1892."

> " In remembrance of the Hon. Standish William Prendergast Vereker, Student of this College 1874—5, Lieut. 3rd Natal Native Contingent. Born Feb. 23, 1854. Fell at Isandhlwana Jan. 22, 1879. 'Dulce et decorum est pro patria mori.' Erected by his kinsman, the Rt. Hon. Viscount Gort, 1913."

> " Sacred to the memory of Harold Leete, who departed this life July 4th, 1913, aged 25. 'Blessed are the pure in heart for they shall see God.' Erected by his fellow students as a mark of esteem and affection."

The service was conducted by the Rev. W. Robins, vicar of Cirencester and Chaplain to the College ; and the dedication prayers were read by the Venerable Archdeacon Sinclair, Archdeacon of Cirencester who preached a sermon at the conclusion of the service.

The service, to which students of all religions were invited, was well attended ; and amongst the congregation were Mrs. Sinclair, Mrs. Wilfred Cripps, Mrs. Leete, Miss Leete, and E. Leete, Esq.

OBITUARY.

We regret to record the death, on May 11th, of Arthur Castle, M.R.A.C., Holland Gold Medallist 1883, F.S.I., after a long illness in London. Arthur Castle was a distinguished Student of the R.A.C., a Gold Medallist, in the Cricket XI. in 1882 and 1883, a very pretty bat, a good field, and winner of the average ball in 1882. He became a land agent of the firm of Castle, Field and Castle, of Oxford, and was for some time an Inspector in the Land Department of the Board of Agriculture.

SCHOLARSHIPS.

The first scholarship for the Lent Term was awarded to Mr. Alan Stewart Patten, and the second scholarship to Mr. Ian Victor Douglas. Messrs. B. Douglas, Sarris, Husain, and Ashtana received honourable mention for the term's work.

SURVEYORS' INSTITUTION.

Mr. W. D. Stevens, M.R.A.C., Nunthorpe, S.O., Yorkshire, and Mr. R. W. Pennington, M.R.A.C., Valley Bridge Parade, Scarborough, passed the recent examination for the Fellowship of the Surveyors' Institution.

Mr. John Brigg, Woodside, Luton, passed the Intermediate Examination.

BOTANIC GARDEN.

In the Botanic Garden during the last half of May was to be seen a *Paulownia Imperialis* (Japanese, *Kiri*) in good flower. The tree produced a few flowers in 1911 but we believe that this year is the only time it has flowered freely and with really good effect, favoured by the extraordinarily warm weather of the first half of May.

CHLORINE IN RAIN WATER.

During the six months ending March 31st, 1914, rain fell on 105 days, the fall being 16·35 inches ; the rain contained chlorides equivalent to ·645 grain of sodium chloride per gallon, that is equal to a deposit of 33·89 lbs. of common salt per acre.

For the twelve months ending March 31st the rainfall was 28·4 inches on 180 days, and the chlorides equal to 45·36 lbs. of salt per acre.

E. K.

OLD STUDENTS.

Mr. H. Lascelles, M.R.A.C., 1912, has received an appointment under the Forestry Department, British East Africa, at Londiani.

Mr. W. Pepper is Master of the Warwickshire Beagles. During his first season (*i.e.* last season) the pack killed its record number of hares.

Mr. G. Murland (R.A.C. 1908-12) has been appointed sub-agent on the Castle Eaton (Cricklade) estate of Captain Alderson-Archer.

Mr. J. Brigg (R.A.C. 1910) has been appointed Chief Assistant to the Glamorgan County Council Small Holdings Committee.

A FAVOURITE HUNTER.

There is a good old hunter!
The best that was e'er lapped in hide;
He has carried me now for ten seasons
And a better I don't wish to ride,
For I'll warrant there's nothing to touch him
When once he gets into his stride.

Last year in the run of the season
We were well to the front and away;
And there wasn't a horse that could catch him
The whole of the rest of the day.
For he's bred just as clean as they breed 'em,
And the beggar's a wonder to stay.

At the Hunt Point-to-Point when I rode him,
He ran in the "Open" and won;
'Twas a pretty stiff course, and he ran it
As I've never seen any horse run,
For he finished hands down in a canter
And he wasn't the slightest bit done.

Yes, he's a good old hunter,
Honest, and brave, and true,
A regular pal, almost human—
More human, perhaps, than a few!
But I'm dreading the day when I lose him,
For I hardly know what I shall do.

K. v. E.

A STUDENTS' NIGHTMARE.

Having spent the previous evening grinding up his Veterinary Notes, Student soliloquises :—

No ! thank you, No !
I dare not go
To the Veterinary Exam.,
Thro' the awful fright
I had last night,
I don't know where I am.

By chance I woke
At the church clock's stroke,
'Twas twelve o'clock, of course,
And saw with fright
In the pale moonlight
" The Outlines of a Horse."

With hideous rattle,
Portending battle,
Its bones fell dislocated ;
Whilst shrieks and groans
And horrid moans
My senses turbinated.

In order fine,
The bones in line
To me I saw advancing,
Olecranon
Did lead them on,
His " os " was proudly prancing.

Then came the sacrum,
And os triquatrum,
'Cross the zygomatic ridge,
With scapula,
And humerus
In elastic cartilage.

The parietal ossa
Came over the fossa
In cuneiformation,

With trapezoid,
And sesamoid,
A fearful combination!

To Ischium
And Ilium
I finally succumb,
While tibia
And fibula
Strummed on my tympanum.

This gruesome crew
Reduced me to
A state of schindylesis;
And even now,
I feel as how
I'm all in little pieces.

So, thank you, No,
I will not go
To the Veterinary Exam.;
Thro' the awful fright
I had last night
I don't feel worth a d——n.

W. F. G.

CRICKET.

The cricket at the College has not been so bad for a number of years. Three matches were won and six lost, the most noteworthy victory being against the Town in the Park. The difficulty has been in getting a side together, a majority of students being quite uninterested in the game. As a result, the team has always contained several players with very little knowledge of the game, especially in the field. The Old Students' match only brought five Old Students to the College. It is a matter to be regretted that such little interest is taken in this match by old students. Wye College brought over a very strong side, and easily won the match by an innings and 300 runs. The fielding of the College side in this match was very poor, a large number of catches being dropped. In several matches we had the assistance of one or two members of the Town team, and our thanks are due to Messrs. J. F. Lawson, W. G. Tovey, C. Allen, J. S. Lawson, W. Pepper, Myles Heywood, H. A. Pritchard, A. L. D.

Perkin, Harcharan Singh, and R. B. Comely, who played in occasional games.

BATTING AVERAGES, 1914.

	No. of Innings.	Not out.	Most in an Innings.	Total Runs.	Average.
H. Singh	9	2	75	162	23·1
M. Kershaw	11	0	90	200	18·2
C. R. Roper	12	0	68	162	13·5
C. B. Saunders	9	2	33	49	7·0
W. O. H. Ellis	10	1	22	50	5·5
S. B. Peek	8	2	11	25	4·2
G. Coundouroff	10	2	17	32	4·0
R. A. Phipps	5	0	4	11	2·2

The following played in one or two matches :—H. A. Pritchard, average 20·3 ; A. L. D. Perkin, average 18·3 ; Harcharan Singh, average 10·6 ; R. B. Comely, average 10·0 ; R. H. Coles, average 3·0 ; J. R. Verel, average 0.

BOWLING AVERAGES.

	No. of overs.	Runs.	Wickets.	Average.
M. Kershaw	180	574	45	12·7
G. Coundouroff	100	416	15	27·7
C. R. Roper	45	202	7	28·8
J. R. Verel	21	101	3	33·6
C. B. Saunders	14	101	1	101·0

R.A.C. v. STROUD C.C.—The first match of the season was played at Stroud on Wednesday, May 27th, and resulted in a win for Stroud by six wickets. The College lost the toss, and were put in to bat, totalling a sum of 174. Kershaw contributed 90 and Perkin 36, but the rest of the side made a poor show against the bowling of Huggins. The home side batted carefully for runs, losing six wickets before the College score was beaten. Huggins scored 62 not out, and Holloway 40. Score :—

R.A.C.	
M. Kershaw, c Munden, b Huggins	90
R. M. Heywood, c Huggins, b Handy	3
C. R. Roper, l-b-w, b Huggins	12
Connolly, b Huggins	0
A. L. D. Perkin, c Hardy, b Holloway	36
C. B. Saunders, b Huggins	0
W. H. O. Ellis, b Huggins	2
H. Singh, b Huggins	6
Hardial Singh, c and b Hardy	10

STROUD.	
A. Miller, l-b-w, b Kershaw	11
M. M. Munden, c Kershaw, b Roper	38
G. W. Holloway, b Kershaw	40
G. A. Hardy, b Roper	4
H. J. Huggins, not out	62
R. T. Godsell, c Singh, b Kershaw	26
H. A. Rodway, b Kershaw	0
F. Ford, did not bat	
H. Gardner, b Coundouroff	1
J. W. Fuller, not out	8

S. B. Peek, c Munden, b Hardy	1
G. Coundouroff, not out ...	0
Extras	14
Total	174

H. Hughes, c Peek, b Kershaw	2
Extras	15
Total (8 wkts)...	207

R.A.C. v. Bourton Vale C.C.—Played on the College ground on Wednesday, June 3rd, and resulted in a win for the visitors by 15 runs. The visitors batted first and scored 136, the College total only reaching 121. The College team were assisted by Mr. J. F. Lawson. Score :—

Bourton Vale C.C.	
G. E. Chambers, st Connolly, b Kershaw	1
E. W. Bishop, b Kershaw ...	14
W. Hill, b Kershaw	26
G. H. Simpson-Hayward, b Coundouroff	24
H. Demer, c Connolly, b Coundouroff	15
E. W. East, l-b-w, b Coundouroff	4
G. Trusted, b Kershaw ...	0
J. C. Cheetham, run out ...	10
A. Taylor, run out	26
W. H. Brierley, b Kershaw...	0
A. Jewell, not out	0
Extras	16
Total	136

R.A.C.	
M. Kershaw, b Chambers ...	34
C. R. Roper, c Taylor, b Hill	6
A. L. D. Perkin, b Demer ...	11
J. F. Lawson, c Simpson-Hayward, b Hill ...	19
C. B. Saunders, c and b Hill...	1
Connolly, b Hill	11
Harcharan Singh, b Simpson-Hayward	18
Hardial Singh, b Simpson-Hayward	1
G. Coundouroff, b Simpson-Hayward	2
S. B. Peek, b Hill	1
W. H. O. Ellis, not out ...	0
Extras	17
Total	121

R.A.C. v. Cirencester.—This match was played in the Park on Saturday, June 13th, and resulted in a win for the College by 53 runs. The College had the assistance of Mr. E. Gurney. The College batted first, and scored 128, Pepper being the highest scorer with 47. The Town score only reached 75, the only player to make any stand being Mills, who scored 34. The last five wickets fell without the addition of a single run, Pepper performing the hat trick. Score :—

R.A.C.	
W. Pepper, c Lewis, b Tovey	47
E. Gurney, b Tovey... ...	7
M. Kershaw, b Tovey ...	17
C. R. Roper, b Tovey ...	1
Connolly, b Tovey	8
H. Singh, b J. S. Lawson ...	17

Cirencester.	
W. G. Tovey, l-b-w, b Kershaw	7
J. S. Lawson, b Kershaw ...	8
F. W. Mills, b Kershaw ...	34
C. Allen, l-b-w, b Kershaw...	3
J. F. Lawson, b Pepper ...	10
R. J. Mullings, b Kershaw...	7

W. H. O. Ellis, c Rawlins, b Mullings	8	H. St. G. Rawlins, b Pepper	1
G. Coundouroff, c and b J. S. Lawson	3	H. Stroud, b Kershaw	0
S. B. Peek, b J. S. Lawson	4	R. A. B. Whatton, not out	0
R. A. Phipps, run out	0	J. L. Jones, l-b-w, b Pepper	0
R. F. P. Monckton, not out	4	P. Lewis, b Pepper	0
Extras	12	Extras	5
Total	128	Total	75

R.A.C. v. MONKTON COMBE SCHOOL.—Played on the College ground on Wednesday, June 17th, and resulted in a win for the College by 7 wickets. The School batted first and scored 114. The scoring was very slow, on a good wicket, the players rather attempting defensive tactics instead of trying to score runs. The College opened the innings with Pepper and Roper, the score reaching 63 before Pepper was bowled. Roper contributed 68, and Saunders 33 not out. Score :—

MONKTON COMBE SCHOOL.		R.A.C.	
J. S. Danen, b Kershaw	9	W. Pepper, b Stott	38
M. W. Leighton, b Coundouroff	6	C. R. Roper, l-b-w, b Kearns	68
P. N. Stott, b Pepper	28	H. Singh, l-b-w, b Stott	0
E. M. Laughlin, b Kershaw	9	C. B. Saunders, not out	33
R. W. Kearns, c Kershaw, b Pepper	3	H. A. Pritchard, b Kearns	9
E. Light, b Pepper	12	M. Kershaw, c and b Leighton	0
H. W. T. Chalcraft, l-b-w, b Roper	7	G. Coundouroff, R. H. Coles, G. Trusted, S. B. Peek, R. A. Phipps,	Did not bat.
F. A. C. Millard, b Kershaw	22		
G. W. Hoghton, run out	0		
T. B. Hoste, b Kershaw	4		
V. H. Jacques, not out	0		
Extras	14	Extras	9
Total	114	Total (for 5 wkts.)	157

R.A.C. v. BOURTON VALE C.C.—The return match was played at Bourton on June 19th. The wicket was very sticky after the rain, and runs were difficult to get. The College led on the first innings by 13 runs, but the batting collapsed in the second innings, the whole side being dismissed for 19 runs. Bourton won by 69 runs. In the second innings Hill obtained 4 wickets for 9 runs, and Hookham 6 wickets for 6 runs, the latter performing the "hat trick." Score :—

Bourton Vale C.C.

First Innings.		*Second Innings.*	
G. E. Chambers, c Connolly, b Lawson	6	c Coundouroff, b Lawson	0
E. W. Bishop, c Saunders, b Lawson	0	run out	2
W. Hill, b Kershaw	11	b Kershaw	31
C. D. Barrow, b Kershaw	7	b Lawson	3
A. Taylor, b Kershaw	1	b Kershaw	2
Major J. T. Noel, b Lawson	1	c Coles, b Lawson	2
E. W. East, c Saunders, b Lawson	1	b Lawson	5
M. H. V. Kendall, not out	1	c and b Lawson	0
G. Hookham, c Ellis, b Lawson	0	not out	35
W. H. Brierley, run out	8	b Lawson	0
A. Williams, b Kershaw	0	b Kershaw	1
Extras	12	Extras	20
Total	48	Total	101

R.A.C.

First Innings.		*Second Innings.*	
M. Kershaw, c Brierley, b Hill	6	b Hill	1
C. R. Roper, c Barrow, b Hill	0	b Hookham	2
Connolly, c Hookham, b Hill	8	c Barrow, b Hill	2
J. F. Lawson, b Hookham	24	b Hookham	0
R. A. Phipps, b Hill	4	c Taylor, b Hookham	1
W. H. O. Ellis, run out	7	c and b Hookham	0
S. E. Ashton, b Hookham	0	b Hookham	0
C. B. Saunders, b Hookham	2	not out	5
G. Coundouroff, b Hill	0	b Hill	2
R. H. Coles, c Taylor, b Hill	2	b Hookham	0
S. B. Peek, not out	4	b Hill	2
Extras	4	Extras	4
Total	61	Total	19

R.A.C. v. Stroud.—The return match was played at the College on June 20th, and resulted in an easy win for the visitors. The College had the assistance of two or three members of the Town team, while Lawson, who has played in several matches for the College, assisted Stroud, and accounted for 8 of the College wickets at a very small cost. It was the best exhibition of fast bowling seen on the College ground for some time. Score :—

R.A.C.		Stroud.	
W. Pepper, b Lawson	1	M. M. Munden, b Tovey	4
M. Kershaw, c Miller, b Lawson	1	H. Poole, c Tovey, b Kershaw	1
		H. J. Betts, b Allen	62

W. G. Tovey, c and b Lawson	18
C. R. Roper, b Lawson	0
C. Allen, b Lawson	6
J. S. Lawson, b Lawson	0
J. R. Verel, b Lawson	0
Connolly, b Lawson	27
W. H. O. Ellis, b Huggins	2
H. Singh, not out	9
G. Coundouroff, c and b Huggins	4
Extras	11
Total	79

H. J. Huggins, b Tovey	3
R. T. Godsell, b Tovey	21
J. F. Lawson, c Connolly, b Kershaw	7
H. M. Miller, c Lawson, b Allen	26
T. J. Bennett, not out	17
A. Hicks, not out	0
A. Bearall, H. A. Payne, Did not bat.	
Extras	29
Total (for 7 wkts.)	170

R.A.C. v. WYE COLLEGE.—The annual match against Wye was played this year at Cirencester on 26th and 27th of June. We scarcely expected to make much of a show against our stronger opponents, but did not bargain for quite such a beating as we received. The Wye team arrived on Thursday night; room was found for some of them at the College, whilst the remainder were entertained by various out-students and others to whom the thanks of the Cricket Club are due. Play began at 11.30 on Friday on a plumb wicket, which, by the bye, lasted quite well through the two days' play. Duffield won the toss, and the innings was opened by Hood-Daniel and Taylor. The latter was scarcely at home, and after one or two poor shots in that direction was taken at backward point with the score at 16. Haines came in and runs were scored very quickly, the first hour producing over 140. Despite several bowling changes the score steadily rose till at 156 Haines was caught at the wicket from a skyer off Coundouroff. One run later Hood-Daniel was l-b-w to Kershaw for a very well played 90, including 15 4's. Simmons and Monro both started somewhat unsteadily, but soon settled down, remaining in till lunch time and carrying the score to 252. After lunch they scored more rapidly till Monro was well caught in the long field for 82. Wood did not give much trouble, being bowled by an offbreak from Kershaw at 364. With Duffield in, Simmons began to hit out, and soon reached his 100. The bowling was now hit all over the field, and several chances were missed. Eventually Simmons was bowled in trying to hook a short pitched one from Coundouroff. In his 127 were six 6's and ten 4's. Though not quite at home with Kershaw for the first over or two, he played a remarkably good innings and gave no chance till he had passed the hundred and was hitting at everything. Duffield's 81 included thirteen 4's, and with his dismissal the innings soon came to an end. 512 is the highest score ever obtained by Wye College, and is the highest ever made against the R.A.C. Our fielding, with one or two exceptions, was very slovenly, and several chances were missed. A special word of thanks is due to Pritchard, who kept wicket exceedingly well considering that he was out of practice and that for the greater part of the innings he was handicapped by a broken finger. The R.A.C. had about an hour's batting on Friday night. Saunders and Verel were out in the first over, but Pritchard improved the look of things somewhat. When stumps were drawn we had scored 40 for 5 wickets. On Saturday morning Kershaw knocked up 32 very quickly, but we were all out for 86. Following on, a slightly better show was made, Pritchard again playing well, whilst Ellis and Singh played useful innings. The match eventually came to an end about 3.15, Wye winning by an innings and 313 runs. The Wye fielding was good, but there was nothing in their bowling to excuse such a feeble display on our part. On Friday evening the Wye team and their various hosts were entertained to dinner by the College. The Principal in a few well chosen words welcomed the Wye team, and suitable replies were made by Messrs. Duffield, Holyman, and Haines. One or two other gentlemen also offered remarks. Subsequently sounds of music and loud laughter were heard issuing from the Out-Students' Common Room. A very enjoyable evening was spent, and the thanks of all are due to Mrs. Gill for the great care she took over the dinner and the catering generally. The trouble she took was only exceeded by the appreciation which her efforts evoked. Score :—

WYE COLLEGE.

A. F. Hood-Daniel, l-b-w, b Kershaw	90
J. S. Taylor, c Saunders, b Coundouroff	2
A. H. Haines, c Pritchard, b Coundouroff	55
J. K. Simmons, b Coundouroff	127
S. E. Monro, c Kershaw, b Saunders	82
C. A. H. Wood, b Kershaw	16
C. A. W. Duffield, c Singh, b Verel	81
G. S. Dixon, b Kershaw	17
G. F. March, not out	3
C. B. Hamilton, b Kershaw	5
B. Borough, b Kershaw	0
Extras	34
Total	512

R.A.C.

	First Innings.		*Second Innings.*	
W. O. H. Ellis	c March, b Wood	0	b Hamilton	22
C. B. Saunders	b Hamilton ...	0	b Hood-Daniel	2
J. R. Verel	c Hood-Daniel, b Hamilton	0	b Duffield	0
H. A. Pritchard	c Hamilton, b Haines	27	b Wood	25

R. H. Coles, b Haines	0	b Hamilton	13
S. B. Peek, b Hamilton	2	b Wood	0
R. A. Phipps, b Haines	4	b Wood	2
M. Kershaw, c and b Hamilton	32	b Hood-Daniel	4
C. R. Roper, c Duffield, b Hood-Daniel	2	b Wood	0
H. Singh, not out	0	b Wood	26
G. Coundouroff, c Duffield, b Hamilton	0	not out	4
Extras	19	Extras	15
Total	86	Total	113

R.A.C. Past v. Present.—This annual two-days match was played on the College ground on Wednesday and Thursday, July 8th and 9th. The Old Students' team had to be arranged by the present cricket captain, who could only get together five Old Students. The team was completed by the inclusion of present members of the College, and was consequently rather weak. Heywood batted well for 57 in the second innings for the Past, while Singh made his highest score of 75 for the College. The Present won by an innings and 42 runs. On Wednesday afternoon Mrs. Ainsworth-Davis entertained a large number of visitors to tea. Score :—

Past.

First Innings.		*Second Innings.*	
A. Bligh, c Kershaw, b Coundouroff	4	c and b Kershaw	0
R. M. Heywood, c and b Coundouroff	18	b Kershaw	57
C. White, run out	1	b Kershaw	8
A. C. Currie, b Coundouroff	11	run out	7
J. G. Mowat, b Coundouroff	15	b Roper	12
A. H. R. Phillips, b Kershaw	0	b Roper	0
A. D. Hopkinson, c Ellis, b Coundouroff	2	not out	6
G. Trusted, c Peek, b Coundouroff	0	l-b-w, b Kershaw	0
M. O'Donovan, b Kershaw	1	b Kershaw	0
R. Monckton, not out	5	c Singh, b Kershaw	0
G. Gazieh, b Kershaw	0	b Kershaw	9
Extras	10	Extras	12
Total	67	Total	111

Present.

C. R. Roper, b Bligh	31
W. O. H. Ellis, b Heywood	1
A. L. D. Perkin, b Bligh	8

Hardial Singh, b White	75
Harcharan Singh, c Heywood, b White	8
C. B. Saunders, b White	6
M. Kershaw, b Heywood	13
R. B. Comely, c Bligh, b White	27
G. Coundouroff, b White	17
G. H. Corbett, c Trusted, b White	0
S. B. Peek, not out	11
Extras	24
Total	221

R.A.C. v. Cirencester.—The return match with the Town was played on the College ground on Saturday, July 13th, and resulted in a win for the visitors by 8 wickets. The College batted first, and scored 182, of which Heywood contributed 81 and Connolly 50. The Town first pair, Lawson and Tovey, took the score to 166 before Lawson was dismissed, Allen was dismissed first ball, but Tovey and Boulton carried the score to 246, when stumps were drawn. Tovey's score of 111 was a very good knock indeed. Score :—

R.A.C.	
R. M. Heywood, l-b-w, b Hartley	81
M. Kershaw, b J. F. Lawson	1
C. R. Roper, b J. F. Lawson	7
R. B. Comely, b Hartley	3
Connolly, c Tovey, b Allen	50
H. Singh, b Hartley	24
W. O. H. Ellis, b Tovey	8
C. B. Saunders, b Tovey	0
R. H. Coles, b Hartley	0
G. Coundouroff, not out	0
J. R. Verel, b Tovey	0
Extras	8
Total	182

Cirencester.	
W. G. Tovey, not out	111
J. S. Lawson, c Kershaw, b Verel	72
C. Allen, c Kershaw, b Verel	0
S. Boulton, not out	36
J. F. Lawson, Capt. J. C. Hartley, F. W. Mills, C. C. Gouldsmith, H. St. G. Rawlins, E. E. Goodworth Major Gray,	Did not bat.
Extras	27
Total (2 wkts)	246

LAWN TENNIS.

All the matches save one on our fixture list were played, Tetbury alone being unable to send a team. Of the twelve played we have won four and lost eight. This year the match v. S.E.A.C., Wye, was played at home, and thanks are due to the kind assistance of those who entertained members of the team. An old student, Mr. W. Brocklehurst, brought a team against us, motoring across country from Hereford; and another old student, the Marques de Murrieta, came over from Spain to play for the Past against us.

The following have played in the matches: A. de C. C. Meysey-Thompson (captain), A. L. D. Perkin, H. J. Thomas, A. S. Patten, G. H. Corbett, Harcharan Singh, of whom the first five have received their colours. Thanks are due to Messrs. A. D. Hopkinson and R. H. Coles for their assistance. Mention should be made of the record of our first pair, who up to the last match have won 23 out of 28 matches played.

Result of Matches.

May 30th, v. Dr. Marshall's Team. Home. Won, 6—3.

A. Meysey-Thompson and A. L. D. Perkin.	Harcharan Singh and H. J. Thomas.	A. S. Patten and J. R. Verel.	Names.
Won. 5—7 6—1 6—4	Won. 7—5 6—1	Lost. 2—6 3—6	Rev. E. C. Wilson and H. Northen.
Won. 6—3 5—7 6—3	Lost. 6—8 5—7	Lost. 1—6 2—6	Capt. Alderson Archer and G. Metcalfe.
Won. 6—1 6—2	Won. 6—3 6—3	Won. 1—6 7—5 6—4	Rev. W. H. Nicol and Dr. Marshall.

June 4th, v. The Beeches L.T.C., Cirencester. Home. Lost, 4—5.

A. Meysey-Thompson and A. L. D. Perkin.	Harcharan Singh and H. J. Thomas.	A. S. Patten and J. R. Verel.	Names.
Won. 6—3 6—1	Won. 6—3 6—1	Lost. 0—6 5—7	E. G. Townsend and H. G. Townsend.
Lost. 6—4 4—6 6—8	Lost. 2—6 1—6	Lost. 1—6 3—6	J. Lawson and Dr. Hughes.
Won. 7—5 6—2	Won. 3—6 6—3 9—7	Lost. 2—6 2—6	Capt. Alderson Archer and F. Hughes.

June 6th, v. Swindon. Home. Lost, 4—5.

A. Meysey-Thompson and A. L. D. Perkin.	Harcharan Singh and H. J. Thomas.	A. S. Patten. and G. H. Corbett.	Names.
Won. 6—3 6—4	Lost. 1—6 2—6	Lost. 1—6 0—6	W. Brown and A. C. Smith.
Won. 5—7 8—6 6—1	Lost. 7—9 6—4 4—6	Lost. 0—6 0—6	F. O. Stote and F. Redman.
Won. 6—1 6—4	Won. 6—1 6—4	Lost. 2—6 4—6	R. Bowly and J. S. Tute.

June 10th, v. Bristol University. Away. Won, 5—3.

A. Meysey-Thompson and A. L. D. Perkin.	Harcharan Singh and H. J. Thomas.	A. S. Patten and G. H. Corbett.	Names.
Lost. 7—5 0—6 6—8	Won. 1—6 4—4 (Retired.)	Lost. 1—6 2—6	A. G. Lewis and W. H. Roy.
Won. 6—3 7—5	Won. 6—3 6—4	Lost. 4—6 6—8	R. H. Tasker and R. K. Pillars.
Not Played.	Won. 6—1 4—6 6—3	Won. 6—1 6—4	E. H. Hayward and F. V. Jacques.

June 13th, v. New College, Oxford. Away. Lost, 4—5.

A. Meysey-Thompson and A. L. D. Perkin.	Harcharan Singh and H. J. Thomas.	A. S. Patten and G. H. Corbett.	Names.
Won. 6—4 9—7	Lost. 4—6 4—6	Lost. 1—6 0—6	T. E. Micklene and A. F. Newbolt.
Won. 6—2 6—3	Lost. 1—6 4—6	Lost. 2—6 1—6	L. d'O. Tollemache and N. G. Addison.
Won. 6—1 6—2	Won. 6—4 12—10	Lost. 1—6 3—6	K. N. Bion and G. C. Colvill.

June 20th, v. Dr. Marshall's Team. Home. Lost, 0—9.

A. Meysey-Thompson and H. J. Thomas.	A. S. Patten and G. H. Corbett.	R. H. Coles and A. D. Hopkinson.	Names.
Lost. 2—6 0—6	Lost. 4—6 1—6	Lost. 0—6 1—6	Capt. de Wiart and Rev. E. C. Wilson.
Lost. 4—6 5—7	Lost. 0—6 1—6	Lost. 2—6 2—6	C. Wood and Dr. Alcock.
Lost. 6—2 3—6 3—6	Lost. 3—6 1—6	Lost. 3—6 2—6	Capt. Alderson Archer and Dr. Marshall.

June 24th, v. Mr. W. Brocklehurst's Team. Home. Lost, 2—7.

A. Meysey-Thompson and A. L. D. Perkin.	Harcharan Singh and R. H. Coles.	A. S. Patten and G. H. Corbett.	Names.
Lost. 4—6 2—6	Lost. 0—6 1—6	Lost. 1—6 1—6	W. Brocklehurst and H. L. Burdon.
Won. 8—10 6—4 6—2	Lost. 4—6 4—6	Lost. 2—6 2—6	C. Hopton and T. Hazlehurst.
Won. 10—8 6—3	Lost. 7—9 2—6	Lost. 5—7 5—7	G. A. Denny and Capt. Bird.

June 26th, v. S.E.A.C., Wye. Home. Lost, 2—7.

DOUBLES.

A. Meysey-Thompson and A. L. D. Perkin.	Harcharan Singh and H. J. Thomas.	A. S. Patten and G. H. Corbett.	Names.
Lost. 2—6 4—6	Lost. 4—6 0—6	Lost. 1—6 1—6	H. W. Kersey and D. R. Edwardes-Ker.
Won. 6—1 6—3	Lost. 4—6 4—6	Lost. 4—6 1—6	L. E. Holyman and D. Pretty.
Won. 7—5 2—6 7—5	Lost. 3—6 4—6	Lost. 1—6 3—6	G. W. Hughes and H. F. Johnson.

SINGLES. Lost, 4—13.

A. Meysey-Thompson	H. W. Kersey	Lost	1—6	2—6	
	D. R. Edwardes-Ker	Lost	2—6	3—6	
	D. Pretty	Lost	4—6	1—6	
A. L. D. Perkin	H. W. Kersey	Lost	4—6	3—6	
	D. R. Edwardes-Ker	Won	6—1	7—5	
	D. Pretty	Won	6—3	6—0	
Harcharan Singh	H. W. Kersey	Lost	1—6	1—6	
	D. R. Edwardes-Ker	Lost	2—6	0—6	
	D. Pretty	Won	5—7	6—4	6—1
H. J. Thomas	L. E. Holyman	Won	6—4	7—5	
	G. W. Hughes	Lost	2—6	4—6	
	H. F. Johnson	Lost	3—6	6—4	3—6
A. S. Patten	L. E. Holyman	Lost	1—6	3—6	
	G. W. Hughes	Lost	1—6	6—8	
	H. F. Johnson				
G. H. Corbett	L. E. Holyman	Lost	0—6	6—2	1—6
	G. W. Hughes	Lost	1—6	6—8	
	H. F. Johnson	Lost	1—6	1—6	

July 1st, v. Wotton L.T.C. Home. Won, 5—1.

A. Meysey-Thompson and A. L. D. Perkin	H. J. Thomas and Harcharan Singh.	A. S. Patten and G. H. Corbett.	Names.
Won. 2—6 6—2 6—4	Not played.	Lost. 2—6 6—4 2—6	Baker and Kingsford.
Won. 3—6 6—4 7—5	Won. 3—6 6—4 6—4	Not played.	McKay and Goss.
Not played.	Won. 6—1 7—5	Won. 6—2 6—4	Sumner and Thacker.

July 4th, v. Swindon. Away. Won, 5—2.

A. Meysey-Thompson and A. L. D. Perkin.	H. J. Thomas and Harcharan Singh.	A. S. Patten and G. H. Corbett.	Names.
Won. 6—3 6—3	Not played.	Lost. 2—6 3—6	W. Brown and A. C. Smith.
Won. 6—0 6—1	Won. 6—0 6—3	Lost. 6—1 3—6 2—6	F. Redman and W. H. Moxham.
Won. 6—0 7—5	Won. 7—5 6—3	Not played.	R. Bowly and J. S. Tute.

July 7th, v. Past. Home. Lost, 2—7.

A. Meysey-Thompson and A. L. D. Perkin.	H. J. Thomas and Harcharan Singh.	A. S. Patten and G. H. Corbett.	Names.
Lost. 6—4 0—6 3—6	Lost. 5—7 3—6	Lost. 4—6 5—7	Marques de Murrieta and A. C. Currie.
Won. 6—2 4—6 6—0	Lost. 4—6 6—3 3—6	Lost. 0—6 3—6	Rev. A. W. Cheales and M. Heywood.
Won. 6—2 6—0	Lost. 4—6 6—2 7—9	Lost. 4—6 3—6	H. Northen and T. G. Mowat.

July 11th, v. East Gloucester. Away. Lost, 0—9.

A. Meysey-Thompson and A. L. D. Perkin.	H. J. Thomas and A. D. Hopkinson.	A. S. Patten and G. H. Corbett.	Names.
Lost. 2—6 5—7	Lost. 1—6 0—6	Lost. 1—6 0—6	R. C. West and Dr. Dobell.
Lost. 2—6 1—6	Lost. 2—6 0—6	Lost. 0—6 0—6	Rev. S. Jackson and R. O. N. Jackson.
Lost. 3—6 4—6	Lost. 1—6 0—6	Lost. 0—6 1—6	F. G. Dyer and B. F. Farmer.

Tournament Results.

Hard Court Doubles.—Messrs. A. D. Hopkinson and Harcharan Singh were the first pair to win the new Challenge Cup presented by Mr. A. Meysey-Thompson, the final being played this term during the first week. The winners defeated Messrs. J. R. Verel and C. Hawdon in two straight sets. Score, 6—2, 6—3.

BILLIARDS.

We have pleasure in recording that the billiard room and table which were practically destroyed during the fire which occurred last November, have now been restored. The room has been greatly improved, a new concrete floor overlaid with pine blocks giving place to the old one of deal boards. The new table, which was formally declared open for play on July 9th, was obtained from Messrs. Burroughes and Watts on advantageous terms, and it is particularly pleasing to note that it was paid for on the day the room was opened.

From the *Agricultural Students' Gazette* for October, 1875.

The following is an extract from a letter of an Old Student, writing from the United States. It shows the value of some veterinary knowledge :—

" As an example of how animals are tortured when left in the hands of ignorant people, I will give you the details of my experience in that line. Not long ago a cow fell ill and showed signs of tympanitis or hoven, for which I treated it with success. However, the animal had evidently received a chill, for which the preceding weather easily accounted. The animal was not perfectly well, but as there was nothing dangerous, I decided that its cure should be effected by careful nursing. While in this indisposed state, a neighbour, who flattered himself he was a practical man, came to the farm and found the cowman milking the cows, and, in the course of conversation, the cowman asked the visitor what he thought was the matter with the above referred to cow. Just at this time I entered the cow house and witnessed the following display of veterinary knowledge :—Stepping up to the cow he laid hold of the tail and felt for the end of the bone ; he then went and felt the horns, and then declared he knew exactly what was the matter, and gave the malady the name of ' The hollow horn.' The symptoms were as follows : He declared the bone of the tail had either receded or shrunken two or three inches, and he imagined he felt as many inches of loose skin, but the characteristic symptom was that the horns were hollow, and this he knew from the fact that they were cold. His treatment for the above was as follows : Split up the tail two or three inches and rub in turpentine ; also a tablespoonful of the same fluid to be rubbed into the skin behind the horns, and the following dose to be administered : three yolks of eggs mixed with one egg-shell full of soot and an indefinite amount of salt ; and two tallow candles to be administered as an injection. This man has the reputation of being a successful practitioner, and treats all cases for this disease. His treatment, however, was not followed in this case."

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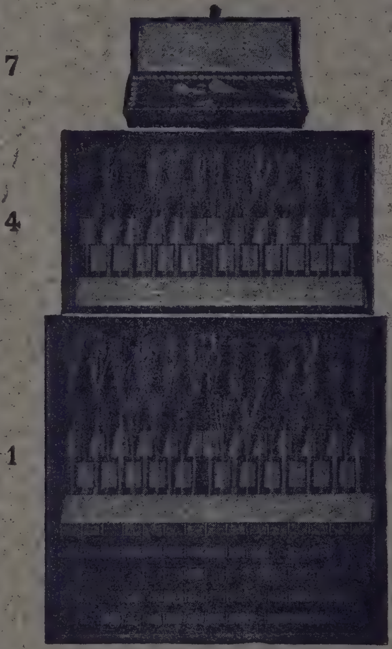

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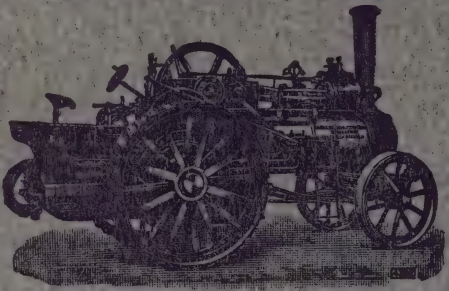

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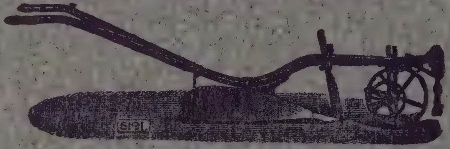

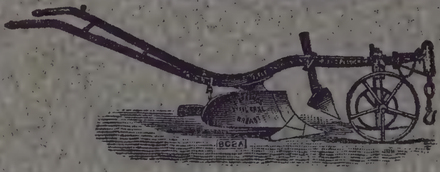

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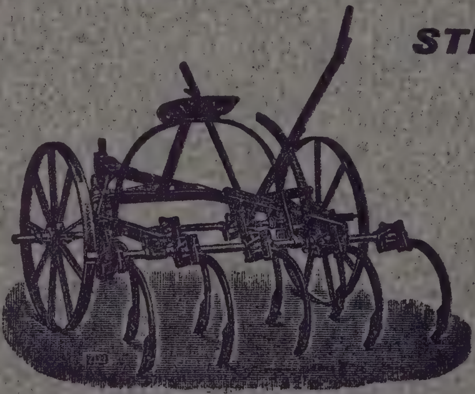

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THE COLLEGE AND THE WAR.

Little more than four months ago, at a Dedication Service in the College Chapel, we did honour to the memory of two benefactors and two students. One of the latter fell for his country at Isandhlwana, and an almost prophetic instinct led us to then and there collect a nucleus of a fund to be devoted to the erection of a memorial to the memory of students who died or were killed in action during the South African War. We shall now, alas, need another memorial to keep in perpetual honour the names of a much larger number of patriotic members of the College. So far our loss has been very heavy, nor is the end in sight.

The appended Roll of Honour, compiled from the imperfect materials available, is large in proportion to our size, and one of which we may well be proud. Corrections and additions will be welcomed by the Editor. It will be noted that our little Officers' Training Corps, only founded in 1909, contributes no less than 32 names, mostly officers, two at least of whom have already fallen in action, besides both our Adjutants.

Owing to the fact that students are mainly recruited from the class which supplies the bulk of officers to both services, our numbers have fallen by about 60 per cent., but we are holding on in the firm belief that a strong reaction will set in as soon as peace is declared, when Agriculture and Forestry are expected to progress in an unexampled fashion. Although the erection of King Edward's Wing has been postponed for the present, the improvements effected in the rebuilt part of the College will place us in a far stronger position as regards lecture rooms and laboratories than before the fire of November last year.

To the Roll of Honour is appended a list of the present members of the Officers' Training Corps, which now includes a number of gentlemen from the town, whose admission is sanctioned by the official regulations. J. R. Ainsworth-Davis.

ROLL OF HONOUR.

PAST AND PRESENT STUDENTS AND MEMBERS OF THE STAFF OF THE R.A.C. WITH H.M. FORCES, 1914.

S.—Service Battalions. *T.*—Territorial Forces. *R.*—Special Reserve.

O.T.C.—Officers' Training Corps, R.A.C.

Alderson-Archer, S. F., Capt., Reserve of Officers (R.G.A.). General Staff Officer, Second Grade.

(*T.*) Anderson, R. G., 2nd Lieut., Royal Gloucestershire Hussars Yeomanry.

(*S.*) Arden, A. C., 2nd Lieut., Army Service Corps.

(*T.*) Ashton, S. E., Lieut., Cheshire Yeomanry.

(*T.*) Baring, A. F. C., 2nd Lieut., 7th (Cyclist) Batt. Devonshire Regt.

(*T.*) Bathurst, Hon. B., M.R.A.C., Lieut.-Col., O.C., 5th Batt. (Reserve) Gloucestershire Regt.

(*R.*) Bathurst, C., M.R.A.C., Capt., Royal Monmouthshire R.E. (Governor of R.A.C.)

Bell, H. P., Lieut.-Col., Indian Army.

(*T.*) Birchenough, R. P., 2nd Lieut., Derbyshire Yeomanry.

Brand, Hon. R., Capt., 5th Rifle Brigade.

(*R.*) Brewster, K. W. (*O.T.C.*), 2nd Lieut., 6th Batt. Royal Fusiliers.

(*T.*) Brigg, J. H., 2nd Lieut., Bedfordshire Yeomanry.

Burne, L. G. L., Capt., Indian Army.

(*T.*) Busk, J., 2nd Lieut., Dorsetshire Yeomanry.

(*T.*) Calvert, H. M., 2nd Lieut., Royal Gloucestershire Hussars Yeomanry.

Carlyon, G., Major, Reserve of Officers, S. Lancs. Regt.

(*R.*) Charlton, St. J. A., Lieut., 4th Batt. Bedfordshire Regt. Killed in action.

Christie, William Charles, Major, Royal Warwickshire Regt., Adjutant R.A.C. O.T.C. Killed in action.

Clive, P. A., M.P., Capt., Reserve of Officers, Grenadier Guards.

(*R.*) Clyne, C., Capt., Royal Warwickshire Regt.

Cochrane, W. O'G., Lieut., R.N.

(*T.*) Coles, R. H., M.R.A.C., 2nd Lieut., W. Somerset Yeomanry.

(*T.*) Comely, C., M.R.A.C. (*O.T.C.*), 2nd Lieut., 2nd Batt. Monmouthshire Regt.

(*T.*) Comely, R. B., M.R.A.C. (*O.T.C.*), 2nd Lieut., 2nd Batt. Monmouthshire Regt.

(*T.*) Cox, D. H., 2nd Lieut., Scottish Horse.

(*R.*) Crawshay, O. T. R., Capt., W. Riding Regt.

(*T.*) Creyke, E. R., Lieut., King's Own Yorkshire L.I.

(*S.*) Cronan, E. J. H., M.R.A.C. (*O.T.C.*), 2nd Lieut., 11th Batt. Royal Fusiliers.

Davy, R. M. M., Capt., Reserve of Officers, Gloucestershire Regt.

(*S.*) de Halpert, R. V., formerly Lieut. R.N., 2nd Lieut., Infantry. Interpreter with the Indian Expeditionary Force.

(*R.*) de Trafford, R. F., M.R.A.C. (*O.T.C.*), 2nd Lieut., 3rd Batt. King's Own Lancaster Regt.

(*S.*) Dobson, G. M., Lieut., 13th Batt. Cheshire Regiment.

(*S.*) Dobson, W. W., Public Schools and Universities Corps.

(*T.*) Done, J. P. C. (*O.T.C.*), Pte., Artists' Rifles.

(*T.*) Douglas, B. (*O.T.C.*), 2nd Lieut., 5th Batt. Gloucestershire Regt.

(*R.*) Downes, V. C., Lieut., 3rd Batt. Bedfordshire Regt. Died of wounds.

(*S.*) Duckworth, A. C., Capt., 5th Reserve Regiment Cavalry.

Duff, R. G. V., Lieut., Reserve of Officers, 2nd Life Guards. Killed in action.

(T.) Duncan, A. C., F.R.C.V.S. (*O.T.C.*), Lieut., Army Veterinary Corps, Royal Gloucestershire Hussars Yeomanry. Professor of Veterinary Science, R.A.C.

(*T.*) Dyer, G. S. (*O.T.C.*), 2nd Lieut., R.F.A.

(*T.*) Fillingham, G. A., Lieut., S. Nottinghamshire Yeomanry.

(*R.*) Gaisford-St. Lawrence, T. J. E., 2nd Lieut., 3rd Batt. Seaforth Highlanders.

Garside, W. F., formerly Professor Veterinary Science. Veterinary Officer in Charge, R.E. Lines, St. John's Camp, Crowborough.

(*R.*) Gay, W. G. M., 2nd Lieut., 3rd Batt. E. Kent Regt. (The Buffs).

(*T.*) Gibbs, G. M., Lieut., N. Somerset Yeomanry.

Gilliat, F. L. (Lieut., R.N.), Lieut., Northamptonshire Yeomanry.

Gilmour, D., Planters' Corps, Ceylon.

(*S.*) Glossop, B., 2nd Lieut., 9th Batt. Devonshire Regt.

(*S.*) Goodall, G. M. L., 2nd Lieut., Infantry.

(*T.*) Godman, Hubert, Lieut., Yorkshire Hussars Yeomanry.

(*R.*) Gordon-Duff, L., Capt., 3rd Batt. Gordon Highlanders. Killed in action.

Grant-Duff, H., Lieut., R.N.

(*S.*) Greenwell, R. E. (*O.T.C.*), Public Schools and Universities Corps.

(*T.*) Grice-Hutchinson, C. G., Lieut., S. Staffordshire Regt.

Grosvenor, Lord Gerald, Lieut., Scots Guards. Wounded.

(*S.*) Hackett, C. B., 2nd Lieut., 6th Batt. Leinster Regt.

(*T.*) Handy, J., Sergt., Royal Gloucestershire Hussars Yeomanry. Assistant in Agriculture, R.A.C.

(*T.*) Hartnoll, J., 2nd Lieut., R.H.A.

(*R.*) Hathaway, N. R. (*O.T.C.*), 2nd Lieut., Army Service Corps.

(*T.*) Hawdon, C. (*O.T.C.*), 2nd Lieut., 4th Batt. Yorkshire Regt.

(*R.*) Heywood, R. M., 2nd Lieut., 3rd Batt. E. Kent Regt. (The Buffs).

(*T.*) Henry, C. E. F., Lieut., Royal Gloucestershire Hussars Yeomanry.

(*S.*) Heydeman, W. E., 2nd Lieut., R.F.A. (temporary).

(*T.*) Hicks-Beach, Hon. M. H., M.P. (Governor of R.A.C.), Hon. Lieut. in Army, Lieut. Royal Gloucestershire Hussars Yeomanry.

(*R.*) Hippisley, H. E., M.R.A.C. (*O.T.C.*), 2nd Lieut., 1st Batt. Gloucestershire Regt. Killed in action, October 23rd.

(*S.*) Hissey, R. J., (*O.T.C.*), 2nd Lieut., Royal W. Sussex Regt.

(*S.*) Hoare, C. M., Lieut., 15th Hussars. Killed in action.

Hoette, A. R., M.R.A.C., Capt., 7th Batt. York and Lancaster Regt.

(*S.*) Hook, V. (*O.T.C.*), Public Schools and Universities Corps.

(*T.*) Hopkinson, A. D. (*O.T.C.*), 2nd Lieut., 4th Batt. Gordon Highlanders. Lecturer in Forestry, R.A.C.

(*T.*) J'Aimay, I. B., Capt., Cheshire Yeomanry.

Jeffery, C. G., Capt., 2nd Batt. Yorkshire Regiment. Died from wounds received in action.

(*T.*) Jeudwine, J. H. W., Capt., 3rd West Riding Brigade, R.F.A.

(*T.*) Johnson, J. G. T., 2nd Lieut., Derbyshire Yeomanry.

Joynson, C.

Keane, Sir J., Bart., Capt., Reserve of Officers, R.F.A.

(*T.*) Kearney, J. J., Royal Gloucestershire Hussars Yeomanry.

(*R.*) Kershaw, M. (*O.T.C.*), 2nd Lieut., 1st Batt. Gloucestershire Regt. O.C. R. A. College O.T.C. Lecturer in Physics, R.A.C. Missing November 7th.

King, W., Royal Flying Corps.

Lane, G. W. B. (*O.T.C.*), Motor Cycle Despatch Rider, R.E.

Lascelles, H. F., M.R.A.C. (*O.T.C.*), East African Force.

(*T.*) Lawson, G., Capt., Westmoreland and Cumberland Yeomanry.

(*T.*) Lees, E. B., Capt., Westmoreland and Cumberland Yeomanry.

Loring, W. L., formerly Adjutant O.T.C.—R.A.C., Lieut.-Col., R. Warwickshire Regt. Killed in action.

(*R.*) Mansel-Pleydell, E. G. (*O.T.C.*), 2nd Lieut., 3rd Batt. Dorset Regt.

Margesson, E. W., Major, Reserve of Officers, 3rd Batt. Norfolk Regt.

(*R.*) Mathias, A. S., M.R.A.C., Lieut., Army Veterinary Corps.

(*S.*) Meysey-Thompson, A. de C. C., 2nd Lieut., 7th Batt. Rifle Brigade.

(*T.*) Mitchell, F. A., 2nd Lieut., Royal Gloucestershire Hussars Yeomanry.

(*S.*) Mitton, H. (Cy. Sergt.-Major), Capt., 8th Batt. Gloucestershire Regt.

(*T.*) Monckton, R. F. P., 2nd Lieut., Montgomeryshire Yeomanry.

(*T.*) Morris-Eyton, R. E., 2nd Lieut., 2nd Batt. N. Midland Brigade R.F.A.

(*T.*) Mowat, J. G. (*O.T.C.*), 2nd Lieut., 4th Batt. W. Riding Regt.

(*T.*) Murland, J. M. G. (*O.T.C.*), Lieut., Northants Yeomanry.

(*S.*) Murdoch, F. (*O.T.C.*), Public Schools and Universities Corps.

(*T.*) Neilson, W. P., 2nd Lieut., Scottish Horse.

Northen, H. A.

(*R.*) Northey, G. E. A., Lieut., 3rd Batt. Essex Regt. Wounded and missing.

(*R.*) O'Donovan, M. H. (*O.T.C.*), 2nd Lieut., 4th Batt. Royal Munster Fusiliers.

(*R.*) Pease, G. B. R., 2nd Lieut., R.F.A.

(*S.*) Pennington, R. W., M.R.A.C. (*O.T.C.*), Public Schools and Universities Corps.

(*T.*) Pepper, W., Lieut., Oxfordshire Yeomanry.

(*T.*) Perkin, A. L. D., 2nd Lieut., 8th Batt. Middlesex Regt.

(*S.*) Phillips, A. H. R. (*O.T.C.*), 2nd Lieut., Army Service Corps.

(*T.*) Rankin, E. C., Royal Gloucestershire Hussars Yeomanry.

(*T.*) Rodd, E. F. S., Lieut., W. Somerset Yeomanry.

(*T.*) Roper, C. R. (*O.T.C.*), 2nd Lieut., 6th Batt. Hampshire Regt.

(*S.*) Saunderson, J. V., Lieut., R.F.A.

Shann, R. A. (*O.T.C.*)

Skipwith, P. A., Major, Reserve of Officers, R.F.A. Commandant of Remount Depôt, Bangalore, India.

(*R.*) Smith-Barry, R. R., 2nd Lieut., Royal Flying Corps. Severely injured.

(*R.*) Spooner, W. P., Lieut., 3rd Batt. Essex Regt.

(*T.*) Spurrier, J. M., 2nd Lieut., 4th North Midland Brigade, R.F.A.

(*S.*) Staples, E. G., M.R.A.C. (*O.T.C.*), 2nd Lieut., 4th Batt. S.W. Borderers.

(*T.*) Stenhouse, V. D., M.R.A.C., Major, West Somerset Yeomanry.

(*R.*) Stewart, R. J., 2nd Lieut., 3rd Batt. The Royal Scots (Lothian Regiment).

Stirling, J., Capt., 1st Batt. Cameronians (Scottish Rifles).

(*R.*) Swanwick, R. Kenneth (*O.T.C.*), Lieut., 1st Batt. Gloucestershire Regt. Killed in action.

(*S.*) Symons, G. G., M.R.A.C., Public Schools and Universities Corps.

(*S.*) Thomas, H. J., Public Schools and Universities Corps.

(*S.*) Vaughan, E. Brettel, M.R.A.C., Sergt-Major, 7th Batt. Queen's Royal West Surrey Regiment.

(*T.*) Vernon, S. R., M.R.A.C., Capt., 4th Batt. Oxfordshire and Bucks Light Infantry.

(*S.*) Walford, E., M.R.A.C., Public Schools and Universities Corps.

(*R.*) Watson, H. T., Capt., 3rd Batt. Liverpool Regiment.

(*T.*) Weigall, W. E. G. A., M.P., M.R.A.C., Captain, Lincolnshire Yeomanry.

(*S.*) Williamson, E. B. (*O.T.C.*), Public Schools and Universities Corps.

(*S.*) Wilson, E. B., M.R.A.C., Captain, 6th King's Own Yorkshire Light Infantry.

(*T.*) Wilson, R. W., 2nd Lieut., W. Somerset Yeomanry.

The following, among others, are serving in the Armies of our Allies:

le Gentil, Jacques, Marechal de Loges, 9th Regt. Cuirassiers, French Army.

Sintier, Georges, Lieut., French Field Artillery.

von Meck, Marc, Lieut., Russian Cavalry.

MEMBERS OF THE R. A. COLLEGE CONTINGENT OF THE OFFICERS TRAINING CORPS.

Captain—J. R. Ainsworth-Davis.

Second Lieutenant—C. B. Saunders.

Corporals.

G. de Coundouroff. A. S. Patten.

Lance-Corporals.

I. V. Douglas. C. Hawdon.*

Cadets.

A. H. Brown.
P. Buckle.
J. M. Burke.
P. Degiardé.
T. C. Dickie.
F. Evans.
J. W. Farmer.
J. S. Harvey.
K. A. Hooper.
W. K. Lace. †
R. G. Phipps.
G. R. Trusted.

Cadets, Town Members.

H. J. Clappen.
T. L. Jones.
H. M. Lewis.
Raymond Matthews.
G. S. Sutton.

* Shortly to be gazetted 2nd Lieutenant.

† Services offered for motor ambulance.

KILLED IN ACTION.

Lieutenant St. John Alan Charlton, of the 4th Battalion Bedfordshire Regiment, Student of the R.A.C. 1913—14, was killed in action on October 25—26. He was appointed to the Regiment in December, 1911, and was a well known follower of the Cheshire Hounds. Charlton will be remembered as a promoter of College social life, especially as an actor of marked ability. Aged 24.

Major William Charles Christie, of the Royal Warwickshire Regiment, was killed in action at Meteren on October 13th, a victim of white flag treachery. After being hit five times, his last words were—"Never mind me, my boys! Look after yourselves!" He was educated at Rugby, where he proved himself a first-class all-round athlete. He kept up his interest and keenness in sport and sports throughout his career, and was a well-known and successful steeplechase rider. He served in the Soudan expedition of 1898, and in the South African War. Major Christie was Adjutant of the R.A.C. Officers Training Corps from October, 1912, till the outbreak of the war, and did much to advance its efficiency and popularity. He was loved by all with whom he came in contact; in his death the country loses a typical gentleman, a true sportsman, a splendid soldier. Aged 42.

Lieutenant Villiers Chernocke DOWNES, of the 3rd Battalion Bedfordshire Regiment, a Student of the R.A.C., 1912—13, was wounded, and died of his wounds in hospital at Saint Omer in October. Aged 23.

Lieutenant Robert George Vivian DUFF, Reserve of Officers, 2nd Life Guards, Student of the R.A.C. 1896—97, is reported killed in action. Aged 37.

Captain Lachlan GORDON-DUFF, of the 3rd Battalion Gordon Highlanders, a Student of the R.A.C. 1909—1911, was killed in action on October 24th. He was the eldest son of Thomas Duff Gordon-Duff, of Park and Drummuir, Banffshire, his mother was the second daughter of the late Sir Charles Tennant. Captain Gordon-Duff served through the South African War with the Gordon Highlanders, and received the Queen's Medal with five clasps and the King's medal with two clasps. He was an accomplished and dashing rider, and among numerous other achievements won the Challenge Cup for the R.A.C. Students' Race at the R.A.C. Point-to-Point Races, 1911. He was a member of the College Military Education Committee. Aged 34.

Second-Lieutenant Harold Edwin HIPPISLEY, M.R.A.C. (Special Reserve), of the 1st Battalion Gloucestershire Regiment, was killed in action on October 23rd. Hippisley was a good student of the R.A.C., he entered in 1909, took scholarships most terms and the Diploma of Membership in July, 1912, with the Haygarth Gold Medal. He was in the Cricket XI., 1910, 1911, and 1912, being Captain during the latter two seasons. He was a brilliant bat and splendid field. He was in the Football XV. for 1909, 1910, and 1911, and was a great help to the Hockey team. After leaving the College he played cricket for Somerset, and hockey for the Western Counties. His home was at Wells, Somerset. He met his death bravely doing his duty, his flank platoon being in a difficult position to which he stuck and probably saved the situation. Another 2nd Lieutenant in the same Battalion was killed and buried at the same time as Hippisley; Lieutenant Kershaw was in the same Company. We understand that the Brigadier spoke very feelingly to the regiment, on the next morning, of the work they had carried out. Aged 24.

Charles M. HOARE. Student R.A.C. 1911—12. Lieutenant in the 15th Hussars, was killed early in the war, his squadron coming under machine gun fire in a village. Cricket XI., 1911. Aged 21.

Captain Claud Giffard JEFFERY, R.A.C. 1898, of the Alexandra, Princess of Wales' Own Yorkshire Regiment, was educated at Bradford Grammar School, and was at the R.A.C. the whole of 1898. He attained his Captaincy in 1909. He was wounded in action on October 23rd, and subsequently died. He served in the South African War, 1900-1, and was awarded a Queen's medal with 6 clasps. Recently he served two years in the Egyptian Army.

Lieutenant-Colonel Walter Latham LORING, of the Royal Warwickshire Regiment, was killed in action, October 24th. He came of a soldiering stock, being of the same family as Sir Nigel Loring, immortalized by Conan Doyle in "The White Company." His near kinsman, John Loring, was a student at the R.A.C. 1880—81. He became Captain in 1898, Major in 1904. Whilst Major he was Adjutant to the newly formed R.A.C. Officers Training Corps from 1910 till October, 1912, when he rejoined his Regiment and became Lieutenant-Colonel. He served in the South African War with the Mounted Infantry. At the R.A.C. he was of great use to the Cadets, and much respected for his carefulness and kindliness. Colonel Loring was struck on the foot by shrapnel, but refused to go to hospital: after his wound was bound up he continued to lead on horseback, and therefore was more exposed; two chargers were killed under him. Aged 46.

Lieutenant Russell Kenneth SWANWICK (Special Reserve), of the 1st Battalion Gloucestershire Regiment. Student R.A.C. 1908—09.

Lieutenant Swanwick was killed during the battle of the Aisne, near Noyou, on September 14th. He was buried by an Army Chaplain at the village of Troyons. The third son of Mr. Russell Swanwick of the Royal Agricultural College, Kenneth Swanwick was well known to several generations of College Students and Staff. He was a keen sportsman, well known as a rider of unusual pluck and judgment both to hounds and in our Point-to-Point races: he gave himself to his military duties with enthusiasm, and became very popular in his regiment and respected and loved by the men under him. At the last he was cheering his men on regardless of his own wounds. Aged 30.

WOUNDED.

Second-Lieutenant R. R. Smith-Barry (R.A.C. 1911—12), of the Royal Flying Corps, fell with his machine from a height of 1,200 feet at Peron, near Cambrai, in August, when both his legs were badly injured. He is making a satisfactory recovery. His mechanic was killed. It is interesting to note that Smith-Barry took his pilot certificate while actually at the College.

Lieutenant G. E. Anson Northey, of the Essex Regiment (R.A.C. 1913—14), is reported wounded and missing.

WITHIN OUR GATES.

By L. Allen Harker.

Some weeks ago it was my privilege to see the instructions sent to one of a band of Territorial nurses who were told off to manage a Home for Belgian Refugees not far from Victoria Station. They were a competent set, these nurses, there being among them certificated cooks and laundresses, and nearly all had done practical work in hospitals. They run the house entirely, doing all the work, and one of their chief duties in respect of the Refugees is to " cheer them up." Now I have heard a great deal and been permitted to see a little of this Hostel, and can testify that in this particular branch of their duties, as in all the others, they are most efficient.

The War has come home to all of us. . . . to a certain extent. Most of us have those near and dear actually in the fighting line. Here in London we work, we economise, we face as best we may the probability of a very hard winter. The facts of the war are ever before us—on the hoardings, in the parks, in the darkness of the main streets at night, in the ever-marching and counter-marching companies of recruits. But so far, mercifully, it has not actually touched our homes. We, "girt about by the inviolate sea," can still look upon our belongings as our own. Children can still play safely in the quieter streets, the tradespeople still call for orders and deliver the necessaries of life with their customary regularity. And we take it all as a matter of course. A visit to that tall house in the long, straight street behind Victoria will make us take all these things considerably less as a matter of course. Behind those decorous-looking walls, passing in and out of the main door, are those whose homes are a wreck of tottering walls and charred woodwork; whose worldly possessions are contained in oddly-shaped bundles; who, some of them, have lost what is far more precious than houses or lands or money in the bank.

And yet if you go in amongst them, they are very like ourselves, very like the comfortable, respectable, well-to-do folk one meets constantly in omnibus or tube. They are in no way consciously tragic: on the contrary, they are, for the most part, very cheerful and courageous, and, above all, pathetically grateful for the welcome and succour they receive.

In addition to the work entailed by the Refugees staying in the house, the young hostesses have to be ready at any hour to give meals, shelter and sympathy to batches of Refugees brought from the station on their way to different parts of the country. And it is here that one is sometimes brought face to face with real tragedy, dark stark tragedy with eyes that have looked upon terrible things. One afternoon, a party of fifteen were brought in, all from one tiny village. Travel-stained and weary, with set faces and tired, toneless voices, they told the busy nurses how their village had been sacked by the enemy, how the handful of inhabitants was taken out, lined up, and every fourth man shot in the presence of the rest. The remainder, old men, women, and little children were let go. They were curiously apathetic. It seemed that fortune had done her worst: there was nothing more to hope for, little to fear. All the windows were open, for it was a warm sunny evening, and as they sat at the meal hastily prepared for them, a barrel-organ in the street started the Brabanconne. One by one, they rose to their feet and under their breath, with hushed, hoarse voices, they sang the song of their country. It seemed a very sacrament of sorrow.

And the poignant contrast! The sunny evening, the quiet street, the jiggy tune, noisy and metallic, that seemed to come dancing in through the open windows—and these poor windle-straws of fate, blown hither by the savage storms of war.

Those who stay in the house are nearly all of the better class. They speak good French and are very friendly and communicative. The men are particularly polite, and always eager to lend a hand in the household work and save the nurses in every possible way. One day, a civil-engineer invaded the scullery, where the nurse in charge was washing up, and demanded employment. Promptly she set him to peel potatoes, and the while they conversed in French. He told her how much it meant to Belgium that we are their allies, and how ardently they admire our soldiers.

"And we, monsieur," she said, shyly, "we say always, 'Vive la Belge!'"

Whereupon, half-peeled potato in one hand, and knife in the other, he leapt to his feet, clicked his heels together and made her a magnificent bow, crying, "Vive l'Angleterre!" While she, not to be outdone—holding jug and dish-cloth, rose and bowed solemnly to him from the other side of the table. Compliments are flying all day long in that house, and the nurses declare that they are getting very French indeed. The other day, a gentle nun being found in tears confided to a sympathiser that she wept because the English are so kind. It was therefore a distinct shock when a Belgian woman standing by remarked, "It is true—they have no manners, but they have the heart excellent." "This," my special nurse told me, "cut us to the excellent heart, for we bow all day long!"

In addition to the dining-room, there is a good large salon with a piano in it, where the guests can sit, and sometimes they have music. One night, a little Belgian woman danced a breakdown in the middle of the room to cheer her compatriots. It certainly had the desired effect, for the danseuse wore very large and long felt slippers, and was so irresistibly comic that the men of the party laughed till they nearly rolled off their seats.

Sometimes one is amazed at the apparent insensibility of some of them, at the stoical way they bear the dreadful lack of news concerning their relatives left behind in Belgium. One man who had lived at the hostel in its earliest days and found another home, still came every day to see if there was any news from his wife. In the general debacle he had been separated from her, and heard nothing since, and had no money to go back and look for her.

Every day he came, but the answer to his enquiry was always "Nothing." He would shrug his shoulders and go away quietly, apparently not so very upset. One day, quite lately, when he arrived as usual, there was a telegram, and it told him that his wife was alive and well in a quite different part of the country from where he left her.

He sat down on a chair in the hall, he could not stand, and burst into sobs, great tearing sobs that broke the heart to hear. They led him gently to the office and shut the door upon him, and he cried his heart out in peace. What he must have borne with silent heroism all those weary weeks ! "Never again," said one who was there, "will I call a Belgian phlegmatic. It was the most pathetic thing I have ever seen."

A soldier who was over on military business, whose home was in Liége, had heard nothing of his wife. One night, at the evening meal, he, too, got a telegram to say she was safe. He ate nothing, but sat through the supper with the precious bit of pink paper spread out in front of him, in a sort of beautiful stupor. But alas ! there are so many for whom no good news can come, who have seen with their own eyes their best and dearest done to death, and it is not difficult to pick out these poor ones ; the eyes that have looked on horrors, helpless to prevent or succour, never quite lose the strained gaze of despair.

But there are many who have by no means lost everything, whose exile is only a temporary inconvenience, who are quite cheerful and full of interest in London. They declare that it is " ugly to break the heart," but all the same they never tire of exploring it. " Le pont de Londres " is one of their great land-marks. They express themselves charmed that the " demoiselles " can all speak French, " and they are much cleverer over our French than we are over their English," one of the demoiselles remarked, "A gentleman to-day was much distressed that none of us seemed to be familiar with a place called ' Zootomtom '—he was convinced we must know it, in our own country, a most important harbour ! when it flashed upon somebody that ' Southampton ' was indicated, and harmony was restored."

Sometimes a guide has to go with one who speaks no English and finds our 'bus system too complicated. One of them one day took a soldier to his destination. A khaki-clad Tommy was sitting on the opposite side of the 'bus. He recognised the uniform and leant forward, tapped the Belgian's knee, and enquired, " Well, how goes it ? " The guide translated, and this drew a torrent of French from her charge, which she translated as well as she could. Very shy, very red, very awkward, at the universal attention he had drawn upon them, Thomas Atkins held out his hand : " Let's shake, any'ow," he said. And they shook.

There always seem to be a great many men at the hostel, and it is really wonderful how they accommodate themselves to strange conditions, and try to give as little trouble as possible. I have seen a most stately old gentleman, who looked a banker at least, ardently brushing the crumbs off the table after a meal and evidently taking the greatest pride in his performance. They seem to realise that the post of the " demoiselles " is no sinecure, and that everything they do is " *par amitié.*"

One night lately, between five and eight o'clock, sixty nuns from a convent in Malines were fed and comforted and sent on their way. The poor ladies were enclosed nuns, one of them was eighty-six and had not been out of her convent for over sixty years. The convent had been burnt over their heads. In addition to the nuns, there were some fifteen other persons, servants, and their Confessor, so the demoiselles had a pretty busy evening. Considering their cloistered life, they were wonderfully calm and full of pretty gratitude. On departure, they assured their hostesses that they would never forget to pray for them. One of the girls, rather wickedly, expressed a hope that they would not pray for the Germans, and they allowed that they thought it would not be necessary. "We can forgive them, but we will not remember them in our prayers."

It is not so easy for the young to forgive.

There was a boy in that hostel who had had a terrible experience. His father was a man of good position living in the country. Their house was surrounded by the enemy, who demanded food and wine. Wine there was in plenty, but there was not enough food, and this boy was sent for some more bread. When he got back with it, he found his father and mother shot dead, and his little nephew, a baby of eight months, had been killed and the body thrown into the well. He was taken prisoner and subsequently released. He looked desperately sad and ill, but did not break down till someone sent him from Belgium a photograph of the baby. Then he wept inconsolably, exclaiming, "*Le bébé ! le tout-petit bébé, si joli et si gai !*"

AGRICULTURE AND THE WAR.

At the present time the war itself, the military operations and military needs, must occupy everyone's attention, to the exclusion of everything else, but even at a time like this it is not inopportune to call attention to the condition of agriculture—for the land produces food, and food after all is the basis of defence, and the safest food supply is the one grown in one's own land. There is no doubt that a great deal more food could be grown in this country than is at present produced. On the one hand small holders could produce a great deal more if they would alter their methods and cultivate more intensively. Except in a few districts and among a few small holders, intensive cultivation is simply not understood at all, and there are 230,000 farmers with holdings of under fifty acres.

At the present time we have in our midst many Belgians who are perhaps the most skilful intensive cultivators in the world. And it would be wise not to let this opportunity slip of learning from them. Could we not place a group, say, of 20 or 30 of these Belgians on the land somewhere so as to form a demonstration small holding colony? Not only is there room for more intensive methods among small farmers, but our large farmers also could do much in this direction, particularly those who have a lot of bad grass that ought to be ploughed up. The opposition to ploughing up any grass whatever is very strong. One reason is a justifiable one: the farmer feels so uncertain in regard to the price of wheat that he does not dare to embark on more arable land. But the other reason, though understandable, is an altogether reprehensible one: that grass land is far less trouble than arable land, and I am afraid that a good many farmers only think of saving themselves and not at all of their duty to their country, in making every acre under their care produce the maximum amount of food for the nation, and the maximum margin of profit for themselves.

A large area of grass land, that can hardly be termed grass land, would be far better under the plough: in 1860 we had four and a half million acres under wheat, last year only one million eight hundred thousand. No one is asking the farmer to break up his good pasture, or to plough up his land, in districts where the rainfall is heavy. It is grass land, which in general terms is let at under £1 an acre, that should be turned up. From the national point of view it is so important for us to grow wheat, and particularly during such uncertain times as these, that I feel very strongly that the Government should have offered some financial inducement to that end, either by granting a bonus or by guaranteeing a price, or by actually undertaking to purchase the 1915 and 1916 wheat crops. I shall be very much surprised if the greatest shortage of wheat is not in 1916. While I am most anxious to see a large increase in the yield of wheat, I would be sorry to see farmers sow wheat on land that was not wheat land—there it would be better to grow oats, which should be a very paying crop during the next two years. Without upsetting the balance of our agriculture, as Mr. Prothero said the other day in his short address at the Farmers' Club, we could produce in this country three-fifths of the wheat that we require. I am sure we could do all that, and yet at present we only produce one-fifth. It is needless to point out how far stronger and better in every way our position would be if we produced at home this larger amount of wheat, instead of the smaller amount.

CHRISTOPHER TURNOR.

To the Editor of the *Agricultural Students' Gazette.*

DEAR SIR,

You ask me to write an article on the New Army for this term's number of the *Gazette.* I fear that we are given very little time indeed for writing anything, and what little spare time we do enjoy is the only opportunity which we have to read our many volumes of military books, and to carry out all our correspondence.

I shall not attempt, therefore, to provide you with anything sufficiently dignified to be classified as an article. I shall merely try to write down a few suggestions and hints which may possibly be of some use to those members of the R.A.C. O.T.C. who may be contemplating applying for commissions in the Army either now, or in the course of the next few months.

Every subaltern when he joins his regiment will immediately have to take over the command of a platoon, and if he happen to be the senior subaltern (by gazette) in his company, he will very probably have to act as its O.C.

The provision of a sufficient number of Majors or Senior Captains to command the companies is the most formidable proposition which the War Office will have to solve in setting the New Army upon a war footing. It would appear, in fact, at the moment, to those who are not privileged to share in the War Office secrets, that it never will be possible to obtain the requisite number of senior officers. The first and second armies must obviously be supplied first, and since even these have not yet got more than two or three majors, at the very most, for each battalion, it does not look as though there would be many left for the third, fourth, and all subsequent armies.

It is therefore clear that many subalterns must be burdened with the cares of the company commander, at any rate for a time.

The company commander's duties are legion. He has to deal with all the company prisoners every morning at 8.45, and, when necessary, bring them up before the C.O. at Orderly Room at 9 a.m. He has to pay his company of about 260 men every Friday (and he must not be surprised if at least 25 per cent. of the men come and complain that they have been paid too little !). He has to decide which men are to be granted the week-end passes, and then has to get the C.O. to sign these papers. He has to keep the company accounts ; and he is bothered all day long by his company-quartermaster-sergeant to sign all kinds of unintelligible documents, and to deal with numerous little matters which may crop up with relation to his company. These are a few of the duties which many senior subalterns will be and are being called upon to perform in the New Army.

It is unnecessary to urge all members of the R.A.C. to join the O.T.C., for I am informed that all those who are eligible have already joined—students and professors alike.

Some may be led into thinking that because the total numbers in the corps are small, no valuable training can be derived from it. Let any who entertain this idea dismiss it once and for all from their minds. Nothing could be more false. All members of the corps can learn to command a platoon and a company, even if it be only on the parade ground, though there be only thirty men in it, by making use of ropes. This form of drill is probably familiar to all the old members of the O.T.C. Two men catch hold of a rope, one at each end, and keep it stretched out taut, and these can be made to represent a section or platoon, whichever is desired. To make it more realistic, have one lot of ropes each about eight yards long, each one to represent a section, for use when doing platoon drill, and another set of ropes about 30 yards long to represent a platoon when carrying out company drill. In this way the frontages will be more accurate. When carrying out platoon drill there will be one man at either end of the rope and a third man told off to act as the section commander, and similarly in company drill this third man will act as platoon commander. It is surprising how much can be learnt in this way, and it is of the greatest utility when there are only a few men on parade. It is of the utmost importance that every man in the corps should be given ample opportunity to practice giving his words of command. Unless commands are given loudly and smartly, the men will not drill smartly. If the commander gives an order in a half audible voice, or slurs over the last syllable of the order, the men will execute the movement in a correspondingly sleepy manner. It is a good plan to make the man who is drilling the platoon or company to stand at least fifty or sixty yards away from his men all the time.

It is of great importance, also, that everyone should have practice in moving across country in the dark. Night work appears to have played an important part in the present war, and such operations can only be successful if the men and officers have had a great deal of training at night.

The general idea of the field work can be learnt from the various text books. I give a list of those which every member of the corps who intends applying for a commission should obtain, if he has not already got them.

(1) Infantry Training (1914).

(2) Field Service Regulations. Part I. (Operations.)

(3) Field Service Pocket Book.

(4) Musketry Regulations.

(5) Tactical Talks and Tramps. By "Sextus" (Major Christie). (Baily and Woods.)

The following are also useful books :—

(*a*) Drill and Field Training. (John Murray's "Imperial Army" Series. 1s. net.)

(*b*) Notes on Visual Training and Judging Distance. By Sergt.-Major Bostock. (Gale and Polden. 6d.)

(*c*) Defence of Duffer's Drift. By "Backsight Forethought." (Gale and Polden. 1s.)

I would advise all those in the Corps to make the best use of their opportunities whilst they are still at the R.A.C. My four years' service in the junior O.T.C., and especially the work I did for my certificate "A," has been of invaluable use to me since I joined this battalion.

Time forbids me to write more. Indeed I have already trespassed too much on your valuable space, and beg your indulgence. I hope, however, that what I have written may be of assistance at any rate to some; and I would add that if I can be of assistance to any members of the R.A.C. O.T.C. in any way in answering questions connected with the work of the New Army, or in any other way, I shall be only too pleased to do so.

Yours, etc.,
BERTRAM GLOSSOP.

9th Batt. Devon Regt., Bisley,
October 22, 1914.

SOME PROBLEMS OF ECOLOGY AS ILLUSTRATED BY GLOUCESTERSHIRE FLOWERING PLANTS.

The more thoroughly we attempt the analysis of any biological problem, the more convinced do we become of its complexity. In pure mathematics or in the mechanics of inanimate things we encounter an immense number of problems which may be complex, which may involve many factors, several of which may be variable, so that their solution can only be approximate; but in biology almost all the factors prove on analysis to be variable within very wide limits, so that the solution of any problem is far less of an approximation to certainty, perhaps, than that of the most complex question involving only the inanimate.

The value of the study of ecology, *i.e.*, that of the mutual relations of organisms and their environment, is that it compels us to face this complexity. The meteorologist may content himself with separate records of atmospheric temperatures, pressures, humidity, or precipitation; or he may average or attempt the summation of his results. The student of soils in the past, whom we should now presumably style an agrologist, may have been satisfied with a chemical determination of the composition of the medium in which the roots of plants with which we are interested find themselves; or he may have added to this an investigation of the water-content of the soil, and possibly of the various conditions in which that water is held in the soil, and of the state of mechanical division of the solid matter of the soil which will so materially affect the penetrating power of roots and the solvent powers of percolating liquids.

The plant anatomist has too often contented himself with a study of the external form of the parts of the individual as it may be seen in the herbarium, with little or no consideration of the surroundings under which it may have grown. Occasionally the effects of such surroundings, the stunted habit of a specimen from the downs or the succulence of one from the beach, may have forced themselves on his notice; but even then the mode in which these exceptional surroundings have produced their effect of stunting or of succulence is a question which he relegates to the physiologist and is certainly one which he cannot himself adequately investigate in the herbarium alone.

Even the physiologist, when he removes a plant from its natural surroundings to his laboratory, from the fluctuating atmospheric conditions of the open air to temperatures, degrees of moisture and of exposure to light generally more constant and more readily measurable, and from competition with surrounding vegetation and from associated animal life, is, as he knows full well, vastly simplifying the problems before him.

The modern study of ecology is obviously a reaction, and, we think, a wholesome reaction. against the too exclusive devotion to laboratory work which marked the seventies and eighties of the last century. It is more the emphasizing of one point of view than an entirely new line of study. We cannot ignore much valuable pioneer work in this direction done in the long past, though, perhaps, the main defect of all such work was the failure to recognise the complexity of the problems involved. Just as Liebig unduly emphasized the importance of the mineral constituents of plant food, so Thurmann, in his remarkable *Essai de Phytostatique*, published as far back as 1849, and too little remembered to-day, unduly emphasized the influence of the mechanical properties of the soil and even of its water content. He considered the disintegration of rocks and the porosity of the resultant soils, though his names *pelophiles* and *psammophiles* seem almost to suggest that there was some special value in clay or sand as such apart from their mere state of subdivision. He has little to say as to aspect, shade, exposure to sun, or what we now term insolation, and nothing as to those important conditions, soil-temperature and the temperature or the acidity of soil-waters.

So, too, other nineteenth century workers in their valuable analyses of single factors in the problem seem to fail to see the wood for the trees. Hewett Watson's painstaking tabulation of the altitudes at which British species grow is useful, though holding good only for the isotherms of our islands and for their oceanic position. The enormous labours of the phenologists, especially in the eighteen-eighties, such as Hoffmann of Giessen and the Rev. T. A. Preston at Marlborough, had some use; but their results, based upon the somewhat arbitrary principle of the temperature accumulated above the base temperature of 42°F. at which vegetation in general was held to be stationary, are true only of the few species observed for a sufficient term of years and for the localities (so far as latitude, altitude, soil, exposure, etc., are concerned) where these observations were made.

It was, no doubt, the third chapter in the *Origin of Species* that forced us to notice the importance of the mutual competitive relations of organisms to organisms in the struggle for existence that is everywhere in Nature; and it is, perhaps, the chief value of Warming's more recent work that it helps us to discuss the influence of each factor without forgetting the co-existence of the others. Schimper sketched in a masterly manner the effects of humidity and temperature in the great regions of the globe: Warming has analysed the factors in greater detail.

It is well not to ignore the often unanalytical work of the field botanists of a former day. In our own area we have, amid the naive enthusiasm of Edwin Lees' *Botanical Looker-out* (ed. i., 1842; ed. ii., 1851), many useful pictures of what we now term plant-associations and a recognition of some of the causes which lead to certain species thus occurring together. At the same time we have now in *Types of British Vegetation*, by Members of the Central Committee for the Survey and Study of British Vegetation (now the Ecological Society), edited by Mr. Tansley, a thoroughly scientific outline of the work to be done in our islands. The outline is more filled in for some districts, such as the Heaths of Scotland and East Anglia, the Chalk, the Pennines, Ben Lawers, and the Norfolk Broads, than for others. Climate is rightly considered as the most general class of factors, soils as less general ; and then in each formation and association the vegetation is represented by lists in which the dominant, sub-dominant, abundant and occasional species are distinguished. The large area of permanent pasture in Gloucestershire, the beech-woods of the Cotteswolds, and the unenclosed Forest of Dean are mentioned ; but the county as a whole is still awaiting an ecological survey.

I only propose here to suggest a few lines of enquiry.

We may, perhaps, group the factors of ecology into three main groups, (*a*) the inherent characters of the plants, (*b*) the environment and (*c*) the relations of *a* and *b*. If, for instance, some species is absent from certain habitats, we ask why. The species present may only be the first comer : it may be barely holding its own, or it may be on the increase : it may spread entirely vegetatively and be unable to ripen seed : after a term of years it may succumb when an exceptional frost penetrates more deeply into the ground, or before the onslaught of some fungal or insect epidemic.

The Cotteswolds are, of course, largely marked on the geological map as calcareous ; but the surface soil may be destitute of calcareous matter. The Upper Lias, on the other hand, say between Leckhampton and Cheltenham, is marked as clay ; but is rich in lime, partly the result of rainwash from the Oolite escarpment, partly from contained calcareous fossils. Many species of plants are commonly regarded as *calcicole* or lime-loving plants, because found wild with us upon limestone ; but this may sometimes be merely because they demand a porous dry warm soil, or one free from acid. The Beech grows excellently upon non-calcareous beds in the Lower Greensand, and most of the orchids of the Kentish Chalk can be found on the granite of the Vosges. The difficulty of cultivating some of our British orchids, such as the Helleborines, may be due to the presence of a mycorhiza in the soil they occur in, or it may be due to their requirements as to shade ; but certainly many of these so-called calcicoles will do well in ordinary well-drained garden soil rich in humus but poor in lime. The Pasque-flower (*Anemone Pulsatilla* Linné), for instance, used, five and thirty years ago, to be grown in the Botanical Garden at Cirencester with some small pieces of limestone round it; but I have seen it flourishing with nothing of the sort in a garden on the Lias in Leicestershire. The Bee Orchis again (*Ophrys apifera* Hudson) is undoubtedly most common in England on limestone; but I found it luxuriant on the Upper Lias near Leckhampton: I have found a plant on the Hythe beds of the Lower Greensand; and Dr. Moss informs me that the small seeds are often carried from the Pennines to the sand-dunes of the Lancashire coast.

It is important to notice where plants will grow if introduced, although, perhaps because the ground is pre-occupied, they do not habitually occur in such a situation. Thus the Fritillary (*Fritillaria Meleagris* Linné) occurs habitually in meadows liable to inundation, as about Minety; but I once found a plant in the midst of a wood of Bluebells, near Fairford, fully twenty feet above the water level. Another species usually a riverside plant is the Meadow Cranes-bill (*Geranium pratense* Linné); but, though it is abundant by Severn and Avon at Tewkesbury, as it is by Thames about Reading, it not only flourishes by the grave of the Rev. W. S. Symonds in his churchyard high up at Pendock, but it is not uncommon in seemingly dry hedgerows on the Cotteswolds. It would seem that the semi-succulent Geraniums, like their relatives the Pelargoniums of South Africa, are very accommodating in the matter of an intermittent water supply.

There is much to be learnt as to the topographical distribution of common species. What, for instance, are the determining factors with *Lychnis dioica* Linné? The White Campion (*L. alba* Miller) luxuriates in the full sun on pure limestone in cornfield or on railway bank; but the Red species is distinctly a woodland form. It rejoices in abundant humus, apparently likes some shade, and certainly does well on sand and gravel; but it is, like the Fox-glove, a calciphobe species? What, too, are the precise conditions of this last-mentioned and notorious antipathy? The Foxglove (*Digitalis purpurea* Linné) is practically unknown on the Cotteswolds, save where in Frocester Park we have a non-calcareous outcrop of Midford Sands. It is the same in other counties, as for instance on the North Downs, where a wood full of Foxgloves will follow precisely the boundary line of some outlier of Tertiary sands or gravel. The Broom (*Sarothamnus scoparius* Wimmer) seems clearly to share the Foxglove's antipathy to lime; but do any of the species of *Ulex*?

The Kidney Vetch (*Anthyllis Vulneraria* Linné) is certainly found almost exclusively on Chalk and other limestones in the south-east of England, rejoicing like the Pasque-flower in a sunny slope; but what is the composition of the soil in which it grows in Cornwall? The Common Privet (*Ligustrum vulgare* Linné) seems certainly a calcicole plant when we see it on the limestones of southern England or Ireland; but it as certainly consents to grow under cultivation not only in ordinary garden loam, which is often very poor in lime, but even on decidedly sandy soils. The same may, perhaps, be said of the Yew, if not also of the Juniper, though the latter is, perhaps, never seen in a wild state in this country far from limestone.

East Gloucestershire is notoriously deficient in true bog-land, and even swampy or marsh-ground is unfrequent, so that there are but few opportunities of contrasting the requirements of those species that require drainage or neutral or alkaline water on the one hand with those fewer kinds of plants which flourish, where others cannot, because they are tolerant of acid or stagnant soil-water.

There are, however, another series of factors the effects of which may be noted in addition to the *edaphic* or soil conditions of which we have been chiefly speaking, those namely of the atmosphere. The humidity of the west, seen markedly in the Fern-flora of the Forest of Dean and in *Arbutus* naturalized at Clifton, extends its influence to the eastern half of the county. The prevalence of the Wall Pennywort (*Cotyledon Umbilicus-Veneris* Linné) is, perhaps, a measure of this influence. But how far inland from the Bristol Channel can the influence of atmospheric salinity be traced in the components of the flora?

It has only been our object to suggest inquiries to the field botanist, and it is obvious that we have left many factors in these problems untouched. Whilst an alien like *Sedum dasyphyllum* Linné spreads readily along the bare tops of our boundary walls, our rare native species *Thlaspi perfoliatum* Linné is readily scorched up in its earliest stages and as readily choked later by other vegetation. The order of arrival and of establishment must be studied from month to month and from year to year on railway banks or other temporarily vacant ground, and here comes in the internecine struggle of annual, biennial, and perennial.

G. S. Boulger, F.L.S., F.G.S.,
Hon. Prof. Nat. Hist., R.A.C.

ON LAYING DOWN LAND TO GRASS AT HIGH ELEVATIONS.

INTRODUCTION.

It is proposed in the present article to discuss the relation that exists between sown and indigenous species in the case of two typical areas, and then to show the intimate bearing of this relationship in regard to the selection of adequate mixtures for putting land down to long duration grass.

It must be remembered that the flora of every district includes a number of grasses, clovers and miscellaneous species which are to be regarded as natural pasture plants, that is to say as plants which are themselves capable of colonizing old wheat stubbles, deteriorating short duration pastures and old sainfoin leys, and which are competent to produce a certain amount of edible herbage. These plants, will, furthermore, be in competition with the sown species when it is sought to put down grass with selected mixtures. Three important questions arise out of these considerations. Firstly, which of the indigenous species, if any, are valuable ? secondly, are these species as valuable or more valuable than anything we can successfully sow ? and thirdly, if it is desired to have certain indigenous species will they come in in sufficient quantity by themselves, or is it advisable to sow them ?

These are local problems which must be studied carefully for every characteristic area. It is here proposed to examine them in the light of information gained (*a*) on the Cotswolds, and (*b*) in Mid-Wales.

(A) THE COTSWOLDS.

(Thin calcareous soils, 430ft.—670ft., studied 1910—11—12.)

The natural grass land of the district investigated is remarkable for a number of very characteristic indigenous species, of which the following are the most important :—Upright Brome Grass (*Bromus erectus*), a particular variety of Sheep's Fescue (*Festuca ovina var.*), Downy Oat Grass (*Avena pubescens*), Golden Oat Grass (*Avena flavescens*), Soft Brome Grass (*Bromus mollis*), Smooth Stalked Meadow Grass (*Poa pratensis*), the Meadow Vetchling (*Lathyrus pratensis*), and the Bulbous Buttercup (*Ranunculus bulbosus*). Other less characteristic plants which are probably also indigenous are Cocksfoot (*Dactylis glomerata*), Crested Dog's Tail (*Cynosurus cristatus*), and possibly also Perennial Rye Grass (*Lolium perenne*), (at all events on the deeper soils). Rough Stalked Meadow Grass (*Poa trivialis*), is often abundant as an arable land weed, and Tall Oat Grass (*Avena elatior*) occurs in coppices and under hedges, but neither of these grasses appear to be normal ingredients on the natural pastures. Timothy (*Phleum pratense*) as provided by seedsmen is not indigenous, but a small bulbous variety (*Phleum nodosum*) is decidedly so.

A considerable amount of data is available as to the behaviour of the above species, and also as to species which are "exotic" to the district-data both as to seeds mixtures used and as to the botanical composition of the herbage of fields of known history.

Results of a large number of analyses made on the R. A. College farm and elsewhere on the Cotswolds have been published in this *Gazette*, and in the *College Bulletin*,* consequently it is not necessary to again present the figures in tabulated form. It will be enough to illustrate the facts which this work has established by considering the species in groups according to their local affinities.

(1.) *Sown Species which are not indigenous on the soils under consideration.*

Tall Oat Grass, Meadow Fescue, Meadow Foxtail, and Timothy are all failures, although both Meadow Foxtail and Timothy attain to a measure of success on residual clay soils which are frequent over the Oolite, and Timothy is successful as a short duration plant even on the shallow calcareous soils. Sheep's Fescue as ordinarily supplied by seedsmen does not establish itself to any extent.

Rough Stalked Meadow Grass establishes itself well, as does also Tall Fescue when the original seeding "takes."

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* R. A. College, Cirencester, Scientific Bulletin, No. 2, 1910. The flora of certain Cotswold pastures.

R. A. College, Cirencester, Scientific Bulletin, No. 3, 1911. Experiments on permanent grass. Effect of drought on Cotswold grass land.

R. A. College, Cirencester, Scientific Bulletin, Nos. 4 and 5, 1912-13. Experiments on permanent grass land and on manuring pastures and meadows.

(2). *Sown Species which, if indigenous at all, are only so to a slight extent.*

Perennial Rye Grass answers well for a number of years, but gradually decreases unless continually aided by manures.

(3.) *Sown Species which are also indigenous, but which do not occur naturally in quantity.*

Cocksfoot is everywhere a success. Crested Dog's Tail does not appear in any quantity during the early years of a ley, but may subsequently gain a considerable hold on the ground. Cocksfoot gains on a field very much in proportion to the amount of seed sown, the same cannot be said of Dog's Tail. It is difficult to say therefore if the advent of Dog's Tail is due to the seed sown, or if it is the indigenous species that has come in, especially as the seed of this grass is capable of lying dormant in the ground for long periods.*

(4.) *Sown Species which are also vigorous indigenous plants.*

Smooth Stalked Meadow Grass establishes itself well, but shows no particular relationship to the amount of seed sown. Golden Oat Grass establishes itself rather slowly, but seems to be aided by being included in the original mixture.

(5.) *Vigorous indigenous plants which are not sown.*

Upright Brome Grass does not early establish itself, but may ultimately almost dominate a field, especially if this is used as a meadow; this is a useful meadow plant on the poorest soils. Soft Brome Grass is capable of coming in in great quantity early in the life of a ley, and when once established may spoil a promising field. The local variety of Sheep's Fescue under ordinary circumstances only becomes well established after a number of years; it is a very valuable plant both for pastures and meadows. The Bulbous Buttercup is seldom seen in any amount on leys of under about ten years' duration. The Meadow Vetchling is also late to come in.

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* That the seeds of Crested Dog's Tail can lie dormant in the soil is proved by grass land in Wales which has been sown with this seed many years ago, and then has come under the plough and been sown with Rye Grass and Clovers only, yet the Dog's Tail has again come up abundantly.

(B.) MID-WALES.

(Limeless soils, 600—880 feet, studied 1913—14.)

The chief indigenous plants on the grass land here studied are as follows :—Sheep's Fescue (*Festuca ovina*), Bent (*Agrostis vulgaris et alba*), Heath grass (*Triodia decumbens*), Yorkshire Fog (*Holcus lanatus*), and Sweet Vernal grass (*Anthoxanthum oderatum*). The clovers are not well represented, the chief are Zig Zag (*Trifolium medium*) and Yellow Suckling clover (*T. minus*). Dutch clover is not an abundant natural plant. The most frequent miscellaneous plants are Rib grass (*Plantago lanceolata*), Creeping Buttercup (*Ranunculus repens*), and Cat's Ear (*Hypochoeris radicata*).

Land is usually here sown down to grass with a mixture consisting only of Perennial Rye Grass, with Red, White, and Alsike Clovers and Trefoil. The Table given below shows how the herbage rapidly deteriorates under this meagre treatment.

Mid-Wales.

MEADOWS SOWN WITH PERENNIAL RYE GRASS AND RED, WHITE, AND ALSIKE CLOVERS AND TREFOIL AT 710 FEET.

PLANTS.	1st Crop.	2nd Crop.	3rd Crop.	4th Crop.	5th Crop.
Perennial Rye Grass...	64·8	52·0	3·0	1·0	trace
Yorkshire Fog ...	5·2	11·0	78·0	45·4	27·0
Agrostis	—	—	3·0	12·0	15·0
Sweet-scented Vernal	·8	11·0	2·0	4·0	7·0
Other Grasses ...	1·4	3·0	4·0	5·0	—
Clovers	26·6	11·0	5·0	6·0 (much Yellow Suckling).	6·0
Miscellaneous Plants, chiefly Cat's Ear and Ribgrass ...	1·2	12·0	5·0	26·6 (large amounts of Yellow Rattle and Ox Eye Daisy).	45·0

Mixtures reinforced with more perennial plants have been tried and these, so far, tend to show that the following plants, although not indigenous on these situations, none the less succeed well :—Cocksfoot, Tall Fescue, Crested Dog's Tail, Smooth Stalked Meadow Grass, and Yarrow.

SUMMARY.

The facts given above together with experience gained both on the areas considered and on high class grass land elsewhere suggest the following generalizations :—

(1) It is comparatively easy to establish good grass on the well aerated clays and loams at favourable altitudes, the reason for this probably is that the valuable and orthodox pasture and meadow plants are indigenous on these soils. It is therefore hard to say in the case of these if the plants found towards the later stages of a lay owe their presence to the original sowing or to indigenous members of the same species having come in naturally. It is, however, a difficult matter to establish good grass at high elevations, especially when the soils carry a very characteristic indigenous flora containing but few valuable herbage plants.

(2) If a strongly indigenous natural or semi-natural pasture is brought under the plough and after yielding only one arable crop is allowed to revert to grass without any additional seeding it will rapidly assume its indigenous characteristics.

(3) The herbage on land (with a soil unsuited to high-class grass production) sown down with a mixture of grasses and clovers will tend ultimately to revert to its indigenous characteristics, and this although it may be isolated from any natural grass land by a surround of arable fields. The indigenous species will, however, follow a regular sequence, competing with each other and with the sown species. The first plants to come in will be arable weeds, chiefly ephemeral annuals.* These will be rapidly followed by Soft Brome Grass (especially on the Cotswolds) and Yorkshire Fog (especially in Wales, where it usually attains to its zenith by the third or fourth year), the next natural grass to make a show will be Sweet-scented Vernal Grass (especially in Wales). As the Rye Grass and sown clovers fail, which will be soon in Wales (after the second or third year) the in-

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* If the seeds of arable weeds are sown with clovers, they will add to this component of the herbage in proportion as the added impurities are species which thrive in the particular district. On the Cotswolds particularly bad weeds in clovers are: Cleavers, Field Forget-me-not, Wild Geraniums, Bladder Campion, Knotted Parsley and Field Madder; whilst in Wales impurities that matter are Sheep's Sorrel, Wild Carrot, and Creeping Buttercup.

digenous clovers will make their appearance, Yellow Suckling Clover will come in first, and will more or less replace the sown Trefoil (which in Wales never lasts long). On the Cotswolds the change in clovers is not so marked since Dutch clover is there an indigenous plant and the soil suits the sown clovers fairly well. At a later state the appropriate variety of Sheep's Fescue comes in in both localities, Bent will also appear now in great amount (in Wales) and the Upright Brome Grass (on the Cotswolds), late arrivals are also Meadow Vetchling (on the Cotswolds) and Zig Zag clover (in Wales). At this stage the arable weeds will be largely replaced by species of a definite grass land character. Such are, on the Cotswolds, the Bulbous Buttercup, Cat's Ear and Lady's Bedstraw; whilst, in Wales, the Creeping Buttercup (which also comes in early, being one of the commonest arable land weeds) becomes very abundant, and Yellow Rattle, Ox Eye Daisy, and finally Hard Heads may at this stage completely spoil the field.

It will thus be seen that grass land reverting to its indigenous character goes through several stages. The herbage will be of most value whilst still dominated by the sown species, of least value during its middle life when it is over-run with Yorkshire Fog and (or) Soft Brome Grass, and of considerable value in its old age when the indigenous pasture plants of some merit (the clovers in particular) are fairly established. In Wales, where the mixtures used are very inadequate, pastures may revert to their natural character in about ten years, whilst on the Cotswolds where the farming is usually higher the process takes considerably longer.

PRACTICAL CONCLUSIONS.

(1.) When laying down land to grass, at high elevations and on soils not suited to the best types of pasture and meadow, it is important to study both the condition of the soil, and the indigenous species found on the natural pastures of the district.

(2.) On such situations it is only possible to maintain a herbage consisting of non-indigenous species for a comparatively short time unless the soil conditions are altered, or unless renovating mixtures are resorted to.

(3.) On the poorest soils it is probably best to rely, in the main, on indigenous species, only using plants which are "exotic" to the locality after they have been carefully tested on a number of well arranged trial plots. This is recommended for three chief reasons. (*a*) Because soil improvement up to the standard of such "exotic" plants as Perennial Rye Grass, Meadow Foxtail, Rough Stalked Meadow Grass and Broad Red Clover would be very costly, and because high altitudes do not favour these plants. (*b*) Because although the above are valuable plants when growing under favourable conditions they only produce a poor stunted vegetation and are not long lived under adverse circumstances. (*c*) Because on the majority of poor soils large sowings of Perennial Rye Grass* favour the spread of such undesirable indigenous plants as Yorkshire Fog (especially in Wales) and Soft Brome (on the Cotswolds), and also of sundry arable weeds, and therefore tend to delay the entry and hamper the development of the more valuable indigenous plants such as the appropriate varieties of Sheep's Fescue (Cotswolds and Wales), Zig Zag Clover and Yellow Suckling Clover (Wales), without contributing anything more than of transient value in return.

(4.)† With regard to obtaining a herbage largely from indigenous species the following suggestions may be made :—The local varieties of Sheep's Fescue are very valuable both as pasture and meadow plants. The evidence so far available, however, suggests that the ordinary seedsman's varieties of this plant are not a success,‡ they certainly are not on the Cotswolds, which has a very characteristic variety of its own. Sweet-scented Vernal Grass on soils that suit it will come in in sufficient quantity unaided, and this expensive seed should never be sown. Bent tends to over-run fields naturally, some of its growth-forms however, especially under appropriate manuring are palatable to stock, it should, nevertheless, not be sown. It is well to make sure of getting both Smooth-stalked Meadow Grass and Yellow Suckling Clover by including them in the mixture, for evidence points to the fact that successful plants of these can be obtained from the ordinary seedsman's varieties, and their early arrival will tend to choke out undesirable weeds. Cocksfoot, Crested Dog's Tail, and White Clover are indigenous on many soils, but do not occur naturally on all, they however succeed almost everywhere from sowing. Cocksfoot tends to check the spread of Fog ; Crested Dog's Tail often competes successfully against Bent ; and even small sowings of Wild White Clover will greatly add to the value of the herbage.

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* See also Findley, Wm. M. Report on Grass Seed Mixtures, North of Scotland College of Agriculture Bulletin, No. 18.

† The Upright Brome is a decidedly useful meadow plant on the Cotswolds—and might with advantage be sown on the poorest soils—there is no reason why the seed should not be obtainable.

‡ Prof. Biffen, in a paper on "The quality of Agricultural Seeds" read before the Farmers' Club last February, remarks as follows : Much of the Fescue seed sold is grown in New Zealand. . . . Whether "it is capable of really establishing itself under our conditions still remains to be proved."

(5.) The known success of Wild White Clover seed, and the value of local varieties of Sheep's Fescue above noted, suggest that much might be done by collecting seed of this and other local plants and also by a process of selection endeavour to further improve them. In addition to the Fescue, Yellow Suckling Clover, Zig Zag Clover and Cocksfoot demand special attention. Cocksfoot is much more variable than is generally realised, it appears to differ considerably when sown from seed obtained from diverse sources. A beginning could be made by comparing the plants obtained from locally collected seed against seed procured from New Zealand and Scotland.

(6.) Plants that may be expected to succeed on unfavourable situations although not indigenous are Late Flowering Red Clover, Alsike Clover (in some localities), Chicory (in many localities), and Tall Fescue (in most localities).

(7.) Two common practices are detrimental to the formation of good grass land on critical situations. (*a*) Turning sheep on to the young seeds the first autumn, this often spoils the clovers (especially Alsike) for the whole life of the pasture or meadow. (*b*) Taking hay each season for the first three, four, or more years, this greatly favours the spread of Yorkshire Fog and Soft Brome and also of such undesirable weeds as Yellow Rattle, Ox Eye Daisy, and Hard Heads. This practice long continued is responsible for the spoliation of many acres of grass land at high elevations all over the country.

(8.) Fields with slightly better soils, and which are easy of access, may be improved somewhat towards the standard demanded by the more orthodox plants. It is found that manures which exert the most influence on the soil give the best results. Note for instance the effects of both farm yard manure and guano on the Chapel Close plots (Cirencester), and the benefits that result from the use of lime and basic slag elsewhere. Good results also follow from the irrigation of poor fields with the liquid waste from manure heaps, the influence of this simple procedure on Rye Grass in particular is very marked.

R. G. Stapledon, M.A.

November, 1914.

To the Editor of the *Agricultural Students' Gazette.*

Pyle, Chale,
Isle of Wight,
Oct. 26, 1914.

Dear Sir,

I am afraid my letter about agriculture in the Isle of Wight won't be very interesting, although I have been farming some 1,000 acres since 1879 I find I am still very ignorant, there is always something fresh to learn in a farmer's life—the most natural one a man can lead.

Agriculture in the island is of a very varied description, owing greatly to the many geological formations.

On the north side the soil is naturally a poor clay, extending from the Solent to the range of chalk hills which run from the Needles to Bembridge. Most of this strong land is in pasture of indifferent quality, much of it was under the plough sixty years ago, but has been found impossible to cultivate at a profit, so it has been allowed to come to grass as best it could. Dairying is the principle means of living. There is a strip of good land running from Yarmouth eastwards on the Bembridge Limestone, which is good corn and turnip land, rather sticky but dry subsoil. The range of chalk downs form a turn out for sheep during the day, which are folded on cultivated lands at night, and so manure the upper lands of the farms. Most of the south side of the island is on the Upper and Lower Greensand, the Gault cropping out in a narrow strip between, and forming an excellent water bearing stratum. The Upper Greensand (locally called freestone) makes excellent pasture and arable, rather strong to work, but dry subsoil, resists drought well, being good for sheep and all kinds of stock—grows lots of bone. The Lower Greensand lands produce the best malting barley and good roots, especially mangolds. This soil is very easy to work.

Dairying is, perhaps, the most important part of island farming. The cows are mostly cross-breds, the Channel Island blood predominating where butter is made, and cross-bred Shorthorns where milk can be sold. Large flocks of Dorset Horns are kept, principally on the south side. They lamb in November, on the grass, then for a few days are run lightly over the young seeds, and in middle December start on white turnips ; The ewes get cotton cake, crushed corn, and hay, the lambs go through the lamb hurdle and have peas, oats and linseed cake as soon as possible, then on to swedes when about six weeks old. The swedes are cut for them, and as many given as they will eat. By the 1st March many will be fat and weigh from 40 to 50 lbs. They are then sent either to London or the big Midland towns. The off-going full mouth ewes are crossed either with a Hampshire, Dorset, or Southdown ram, the lambs produced come to hand a fortnight earlier than the pure Dorset Horns. These are fatted together with their mothers.

I must thank the R.A.C. for the much useful knowledge I obtained, especially in agricultural chemistry and veterinary work in the early seventies.

The Isle of Wight is a pleasant place to live in as well as to farm. We are very free from insect pests and animal diseases. We have a mild climate in winter, and cool (especially on the channel side) in the summer. There is a good pack of fox hounds, also harriers and foot beagles. There are nine golf courses, so that anyone can get plenty of recreation.

Henry Way, M.R.A.C.

COTTON GROWING IN EGYPT.

The maximum value of the land can only be utilised when a suitable rotation of crops is practised, and a very common rotation is wheat, bersim, cotton. The aim in constructing a rotation being to tap the various layers of the soil, to retain the balance of food materials, and to restore the fertility lost by the growth of exhausting crops.

By far the most important and paying crop in Egypt is cotton, and for the last fifteen years, if the soil and district will grow good cotton, the remaining crops of the rotation have been made subsidiary to and preparatory to it.

There can be no doubt that the prosperity of the country at the present time is very largely due to the high prices which have prevailed for Egyptian cotton. And these high prices are entirely due to the quality of the fibre produced, and the pre-eminence of Egypt as a cotton producing country can only be maintained as long as the land continues to produce fine qualities. The cultivation of ordinary cotton, that is, cotton which possesses a staple of one inch or less, is a comparatively easy matter in tropical and sub-tropical countries, but the matter is very different when the production of a staple of 1¼ inches or more is desired. As the demand for finer and better fabrics increases there will be an increased demand for long stapled Egyptian cotton. For the production of high grade cotton has up to the present been almost an Egyptian monopoly except for a few small areas in America ; but as would naturally be expected, serious attempts are being made in the U.S.A. to produce a higher grade cotton on a large scale.

At the present moment, owing to the war, a grave economic danger has arisen in Egypt with regard to the cotton crop. For the crop in 1913 amounted to 7,554,000 kantars, and this year's crop is estimated at 8,000,000 kantars. In 1913 the export of cotton from Egypt amounted to £28,708,000, and was distributed as follows :—

England and Dependencies	£12,721,000
Germany, Austria and Belgium	£5,583,000
France	£2,514,000
U.S.A.	£2,442,000
Russia	£2,190,000

And as the consumption of Germany, Austria, and Belgium must practically cease for an indefinite period, and that of Russia and France will be considerably decreased, the problem is how to dispose of the crop. It is stated that England and the U.S.A. will take nearly the whole of it, and that the U.S.A. will be allowed to sell some of her own cotton to Germany and Austria, for of course the U.S.A. has a vast crop of her own to dispose of. At any rate the Egyptian Government have taken a decisive step and has prohibited the sowing for 1915 of more than one-half the present area under cotton, and commanded that cereals shall be sown on the remaining area.

Now Egypt is an excellent wheat country, and has already a large area under wheat and maize. In 1913 the areas were :—Cotton, 1,723,094 feddans ; maize, 1,632,556 feddans ; wheat, 1,305,578 feddans. And it is certain that there will be a shortage of grain in 1915—1916, and good prices will be realised, so that the Egyptian proprietors and occupiers ought not to lose by the substitution of cereals for cotton, and the land will benefit by the change in areas where the cotton crop has been taken rather too frequently.

Though cotton may be grown with success upon a great variety of soils, they are not all equally suitable to the crop. On sandy soils the plants are small and the yield is inferior. On rich heavy clays the plants are inclined to be coarse, and often produce but a small proportion of fibre in proportion to the larger size. The best soils are either a medium loam, a heavy loam with lighter subsoil, or a light loam with heavier subsoil ; but generally speaking the ideal soil should incline rather to clay than to sand.

In order to obtain the best results the land intended for cotton should be ploughed some time before sowing. The cultivations should be thorough and to a depth of about a foot ; the " Zahafa " or European roller is largely used to consolidate the soil. When the land has been thoroughly prepared, it is ridged, the ridges running east and west in order to obtain full advantage of the sun ; for ridging the native plough can be adapted, or the English ridging plough may be used, and afterwards the ridges are made perfect by hand labour. The seed is sown on the south side of the ridge, to protect the plant from the prevailing north winds during the early stages of growth.

It is most important that the seed should be of the very best quality and true to a known variety selected because of its desirable qualities and suitability for the district in question. March is essentially the month for cotton sowing in Egypt. The seed is put in at two-thirds of the distance from the bottom of the furrow to the top of the ridge, holes being made with a stick at the required distance apart, and eight or ten seeds being deposited in each hole at a depth of about two inches. A watering is given immediately after sowing. If any seeds fail to germinate, re-sowing is carried out at once. The seedlings appear about fifteen days after sowing, and as soon as they are well out of the ground a hoeing should be given to destroy weeds and to break up the surface layer. The first watering takes place from thirty-five to forty days after planting, and the number of waterings from the time of sowing to the first picking is generally from eight to ten.

The picking of cotton commences in Upper Egypt during the end of August and beginning of September, but not until the middle of September in the Delta. The lower bolls are those which open first and form the first picking, while those which are on the upper part of the plant are called " Nili " bolls, and form the second picking in October. And the result of the year's crop is very largely influenced by the success or otherwise of the opening of these " Nili " bolls, for they sometimes suffer so much from the depredations of the cotton boll worm that the entire second picking is destroyed. The cotton after picking may either be placed in the store house, the two pickings being kept separate, or is immediately placed in large sacks holding 400-425 rotls, and sold at once. The crop is generally sold as seed cotton, and is weighed at the store in the presence of the buyer's agent and the seller. It is then despatched to one of the numerous ginning factories which are scattered throughout Upper and Lower Egypt, where the seed is separated from the fibre.

The question of manuring is one of great importance and of some difficulty. The crop responds well to manurial treatment, and seems to be most benefited by dressings of farm yard manure, but unfortunately the supply of this is not nearly large enough, and the grower must have recourse to artificial fertilizers. When F.Y.M. is available it is usually applied at the time of the last ploughing, and is thus worked into the soil just before ridging takes place. Old dung is preferable to new as the latter tends to cause rank growth and to delay maturity. As regards artificials, trials carried out in recent years have demonstrated that phosphoric acid in the form of superphosphate should form the basis of any scheme of manuring, 2 cwt. per feddan being a common dressing. Opinion differs as to the time and method of its application, however, and it may be sown broadcast alone at the time of the last ploughing, or else mixed with nitrogenous manure and earth at the same time, or again it may be put on to the bersim crop where that crop precedes cotton. Differences of opinion also exist as regards nitrogenous manures. Whereas phosphoric acid hastens maturity and improves the quality of the fibre, nitrogen increases the growth and retards maturity, and if applied in excess will reduce the weight of seed and consequently the yield on ginning. Therefore, great care must be exercised in the quantity of nitrogen applied. On poor soils producing naturally three to five kantars per feddan, ½ cwt. of a mixture of nitrate of soda and sulphate of ammonia could be applied advantageously, whereas on a richer soil not more than one half of that quantity would be given. As regards lime and potash, the soils are usually naturally supplied with enough of these constituents, and they are hardly ever applied artificially. It may be added that other factors such as good drainage and efficient cultivation have a great influence on the yield.

Other crops commonly grown in Egypt besides cotton are—wheat, maize, barley, bersim, rice, millet, beans, fœnugreek, flax, sesame, and sugar cane.

1 feddan equals 1·038 acres; 1 kantar equals 99·05 lbs.; 1 rotl equals ·99 lbs.

AHMED SAMY.

OBITUARY.

We regret to notice the death of Robert Hastings Knight Bruce, M.R.A.C. (1875), F.S.I. He was a distinguished Student of the College, in the Football XV. of 1874, and the representative of Athletics on the Committee of the Students' Club, 1874 and 1875. Mr. Knight Bruce was for years land agent to the Right Hon. the Earl of Rosebery, at Mentmore. He died on November 2nd, at 5, Essex Villas, Campden Hill, London, after a long illness bravely borne. Aged 56.

We regret to record the death of George John Mulcaster Burnett, M.R.A.C. (December, 1881), M.R.A.S.E. by exam., F.S.I. Burnett was in the Football XV. in 1880, and in the Cricket XI. in 1881, being especially useful as a bowler and in the field. He was for many years agent to Baron Aldenham (H. Gibbs) of Aldenham House, Elstree, Herts. He died in a nursing home in London on August 31, and was buried on September 3rd in Elstree Churchyard. Aged 56.

We much regret to note the death of Colonel Thomas William Chester-Master, of The Abbey, Cirencester, and Knole Park, Bristol. Colonel Chester-Master was staying at Stratton House, Cirencester, and on October 26th met with an accident whilst riding, he appeared to be recovering, but complications ensued, and he succumbed to a sudden heart attack on November 14th. He was for many years a Governor of the Royal Agricultural College, and took a warm interest in it, often presiding at the distribution of diplomas and prizes. He was the last M.P. for the borough of Cirencester before the Reform Act, 1884-5. He was elected for the Cirencester (East Gloucestershire) Division of the county in October, 1892, by three votes over Mr. H. L. W. Lawson, on an official recount in the Law Courts in December the majority was reduced to two, and on a scrutiny on January 2, 1893, before Justices Hawkins and Vaughan Williams, the Judges found an equality of votes and ordered a new election: this took place on February 23rd, when Mr. Lawson was returned by a majority of 212. Colonel Chester-Master was always a good friend of the R.A.C. Aged 73.

We are very sorry to record the death of Thomas Douglas, M.R.A.C. (1911), at "Oakdene," Wellington, Cape Colony, on August 21st, 1914, of peritonitis following appendicitis. He had been farming in S. Africa since he left the College. He contributed an interesting article on "A Year's Work of a South African Farm" to the last number of our *Gazette*. He was a hard working student, popular with Staff and Students, and great regret is felt that his subsequent career should have been prematurely cut short. Aged 23.

FARM NOTES.

THE DAIRY HERD.—A Shorthorn heifer, Red Lassie 2nd, purchased at the Dryleaze sale of Dairy Shorthorns, has been added to the herd. The heifer is by Iceberg (105784), a bull with a good milking ancestry, bred by the late Mr. G. Taylor; and her dam, Red Lassie, was awarded a certificate of merit at the London Dairy Show, 1909. Her grand-dam, Haddon Lassie, also won first prize in the pure-bred dairy heifer class at the R.A.S.E. Show at Derby, 1906. Red Lassie 2nd was entered for the London Dairy Show, 1914, but it was found impossible for the College to exhibit her this year.

EXPERIMENTAL WORK.—During the summer, experiments have been carried out in No. 11 on the top-dressing of Oats and Cabbages with nitrogenous manures, and the trials with varieties of Potatoes have been continued. The yield of Potatoes in the neighbourhood, due largely to the dry weather during the growing period, was distinctly below the average, but the eating quality of the tubers grown on the College Holding has proved to be very good. Experiments were also conducted on Mangolds, Oats, and Lucerne with Bacterised Peat; but the results so far obtained have been disappointing, showing no increase for the dressings applied.

The season, owing to the wet weather in the spring and the consequent late date of sowing, was unfavourable for the growth of the Oat crop; but the plots top-dressed with Calcium Cyanamide and Calcium Nitrate, so as to apply equal amounts (20 lbs.) of Nitrogen per acre, showed some difference as regards total produce per acre. The plot receiving a top-dressing of 112 lbs. of Calcium Cyanamide per acre thus increased the total weight of produce to the acre by 3·5 per cent. over the unmanured plot. While the plot which was dressed with 158 lbs. of Calcium Nitrate showed an increase in weight of produce of 12 per cent. on the unmanured plot. The Calcium Cyanamide was sown before the Oats were through the ground, and then harrowed in. The Calcium Nitrate was applied as a top-dressing after the Oats were up.

FARM EXCURSION.—On Friday, November 20th, at the kind invitation of Mr. Alexander Iles, a party from the College visited the Park Farm, Fairford, to see his Vaccar Milking Machine in operation. Mr. Iles conducted the party round the premises himself, explaining very fully all the advantages of the machine which he has now had working for two years. After inspecting the buildings and the live stock, a visit was paid to the well-kept gardens of Fairford Park, and to the part of the farm adjoining the river Coln. Before returning home the party was entertained to tea at the Park Farm, and the members of the College wish to record their best thanks to both Mr. and Mrs. Iles for the kindness and hospitality shown them on this occasion.

DEMONSTRATION ON FARM MACHINERY.—An interesting demonstration was given at the steading on Wednesday, November 25th, by Mr. H. W. Stearn, of the firm of Massey-Harris, Limited, on the self-binder and other farm implements. Mr. Stearn's lucid explanation of the various machines he dealt with was much appreciated, and he was particularly good in answering the numerous questions which were put to him. It is to be hoped he will be able to visit the College again at an early date.

MANGOLD RAISING COMPETITION.—On Friday, October 30th, the annual Mangold Raising Competition took place, the weather being particularly favourable for the work. The results were as follows, viz. :—Prize, Hooper and Trusted ; very highly commended and reserve, Hawdon and Moses ; very highly commended, Calderon and Efflatoun, Degiardé and Ralli, Evans and Burke ; highly commended, Douglas and Phipps.

CHLORINE IN RAIN WATER.

For the six months ending September 30th, 1914, it rained on 71 days, the total fall being 11·61 inches : the rainwater contained chlorides equivalent to ·306 grains of sodium chloride per gallon, and the whole deposit per acre was equal to 11·41 lbs. per acre. For the twelve months ending at the same date the rainfall was 27·96 inches on 176 days, and the chlorides equal to 45·3 lbs. per acre.

E. K.

LECTURE ON QUEENSLAND.

On the evening of November 19th, Professor E. Blundell, late of the R.A.C., gave a very interesting and instructive lecture on Queensland in the Out-Students' Common Room: it was illustrated by numerous lime-light lantern slides. Professor Blundell farmed in Queensland for several years in the 'sixties and 'seventies, and his personal experiences were of great interest and added greatly to the value of his opinions on the present and future prospects of the Colony. He began with an historical summary of the discovery of this part of Australia, its use as a convict settlement, its growth, and the development of its resources. Most excellent illustrations were shown of Sydney and its harbour, of Brisbane and other places, at different dates to illustrate their growth; gold mining at Mount Morgan, pastoral agriculture, sheep shearing, sugar cane growing, and other agricultural operations were shown. The scenery came in for its share of attention, and finally the fauna and flora, from the aboriginal man, not such a low type as often depicted, to other types such as the emu, the lyre bird, and the platypus; the bottle tree and other remarkable examples of vegetable life were also shown. The last picture was that of "Our Boss," the King, which brought forth the singing of the National Anthem. The proceedings ended with a very hearty vote of thanks to Professor Blundell for his kindness in giving us this very useful and interesting lecture.

CIRENCESTER MOTOR AMBULANCES.

On November 13th three fully equipped ambulances left Cirencester for London, where Dr. Graham, Commandant of the Cirencester Voluntary Aid Detachment of the British Red Cross Society, handed them over to the parent Society. They passed on to Folkestone for the cross-channel journey the same day. They were built by Messrs. W. G. Bridges to specifications of the British Red Cross Society, on 16-20 Sunbeam chassis, to hold four wounded men on stretchers or twelve slightly wounded men. Each ambulance is and will be driven by a local chauffeur and accompanied by a member of the Ciceter Detachment of the British Red Cross Society. A small brass plate on the respective ambulances states that No. 1 is "Presented by the Earl and Countess Bathurst." No. 2 is "In memory of Major William Charles Christie, Royal Warwickshire Regiment, killed in action at Meteren, October 13, 1914; and of Lieutenant Edwin Winwood Robinson, 5th Lancers, killed in action October 26, 1914, near Ypres." No. 3 is "In memory of Lieutenant Russell Kenneth Swanwick, 1st Gloucestershire Regiment, killed in action, September 14th, 1914, at the battle of the Aisne."

DIPLOMA EXAMINATION, 1914.

The Diploma of Membership with Honours (M.R.A.C.) was awarded at the end of last Term to—

Bayard Douglas, Hill House, Sapperton, Cirencester;
Syed Sardar Husain, Oude, India;
Brajlal Ashtana, Lucknow, India;
Hamid Sirry, Cairo, Egypt;
Deoki Nandan, B.A., Rajputana, India;
John Markett Rayden, London; and
Rowland Humphrey Coles, Taunton.

The external examiners were Professor W. McCracken, F.S.I., in Agriculture; Dr. J. A. Voelcker, F.I.C., in Agricultural Chemistry; Leslie S. Wood, F.S.I., in Forestry and Estate Management; Professor H. Robinson, M.I.C.E., in Surveying and Engineering; Professor Wooldridge, F.R.C.V.S., in Veterinary Science; and Professor G. S. West, D.Sc., in Agricultural Botany.

SCHOLARSHIPS.

The First Scholarship last Term was awarded to Alan Stewart Patten. Honourable Mention for the Term's Work to G. G. Sarris, B. Douglas, S. S. Husain, and I. V. Douglas.

CROSS COUNTRY RACE.

This annual race took place on Wednesday, November 12th. The course was round the College Farm, a distance approaching four miles.

There were six starters, all of whom finished notwithstanding the very unfavourable conditions of sticky soil and driving rain during the race.

Evans was an easy winner in just over 25 minutes, Patten second, followed by Hawdon, Buckle, Lace and Degiardé. A very creditable performance in which the first year men show up well.

REVIEWS.

SCIENCE AND THE MILLER. By J. S. Remington, M.R.A.C., Director of the Aynsome Milling School and Testing Station, Lancashire. Liverpool: The Northern Publishing Company, Limited. 1914. pp. 166.

Mr. Remington having a very strong belief that the modern miller must keep pace with the advancement of science and the progress of technical skill, has written this little book in the hope that it may prove of value both for the older members of the trade, not able to devote much time to scientific study, and to the younger generation now setting out on their life work, whom it may introduce to the subject and stimulate to further research. As a motto for the book he takes, appropriately, a saying of the great Mahomet: "Trust in Heaven, but tie up your camel." Many English manufacturers, especially at the present crisis, may well ponder and act on this saying. There are several illustrations, and much useful information is condensed in a small space. We are pleased to notice that the *Agricultural Students' Gazette* is laid under contribution by extracting from a paper by Mr. C. C. Duncan published in the number for December, 1911.

THE WAR AND THE WORLD'S WHEAT. By Alfred Akers, F.S.S. London: Simpkin, Marshall, and Co. 3d. net. 23 pp.

In this little pamphlet Mr. Akers discourses on the risks of a shortage of wheat next harvest. He has collected his statistics and uses them for his well-considered arguments with greater care than most talkers or writers on the subject. Mr. Akers concludes that there must be a deficiency in the next harvest of the European fighting countries, no sufficient nor efficient substitute for wheat can be found; England could alleviate the shortage by growing more wheat, though with obvious difficulties; it has been suggested that the farmer should be guaranteed a fixed minimum price for his 1915 wheat crop, and here many difficulties arise; Mr. Akers seems to advocate the paying by Government of a definite bonus *per acre* upon the land seeded to wheat in excess of that so seeded the previous year. Unless the bonus were small, this might be a bribe to put unsuitable land down to wheat, but in any case Mr. Akers' facts, figures, and arguments are well worthy of careful consideration, whether the particular machinery to be employed to keep up the supply of bread is agreed to or not.

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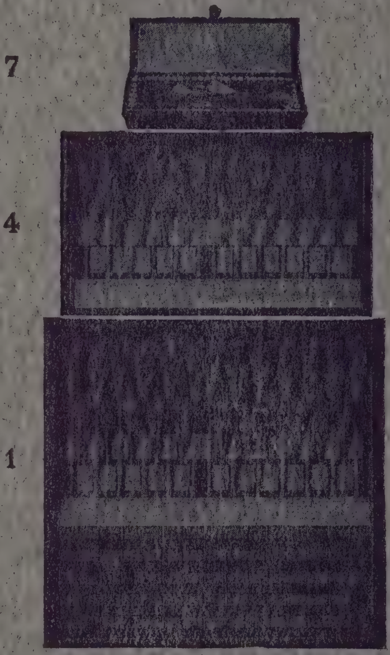

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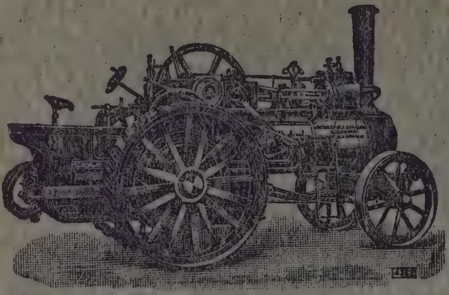

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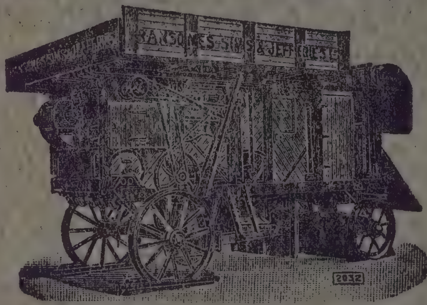

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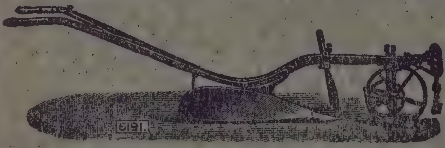

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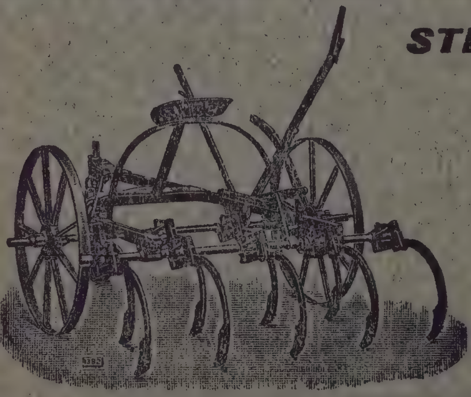

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The Red Cross in the Great War.

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FOR the task of succouring the sick and wounded in the great war the two recognised Red Cross Societies in this country—the St. John Ambulance Association and the British Red Cross Society—have joined forces. Their primary object is to supplement the work of the Royal Army Medical Department in the field, and to render such medical aid as may be possible to our gallant Allies.

THIS IS A GREAT AND NOBLE TASK. If we desire to show an affectionate concern for those stricken in our defence, no more practical method exists than to give financial help or personal service to the work of the Red Cross.

The St. John and the Red Cross have already sent out to the Continent a personnel of upwards of 2,000, comprising doctors, trained nurses, orderlies, and chauffeurs. Three ambulance trains have been provided and over 900 motor ambulances have been sent for the quick transport of the wounded from the fighting line, which very often means life when death would otherwise be certain. Stores of every description and some hundreds of thousands of garments have been despatched to the theatre of war. The Red Cross Societies have established large hospitals in Paris and elsewhere in France. In this country they have a hospital at Netley, and have completely equipped the King George Hospital in London, and in addition, have provided over 23,000 beds—all accepted by the War Office—and have made arrangements for the care of over 25,000 convalescents.

EVERY DAY SEES AN INCREASE in the work of the Red Cross and in the cost of its maintenance. The money subscribed is carefully administered, the arduous task of organisation is performed by men and women of eminence, who accept no pay for what they consider a labour of love. The Red Cross doctors, nurses, and orderlies win the affectionate gratitude of those to whom they minister by their skill, devotion, and bravery.

WILL YOU NOT HELP IN THIS GREAT WORK by contributing something, however little, to the funds of the Red Cross? The least which those of us who are compelled to stay at home can do is to help the Red Cross to succour in their hour of need the brave and patriotic men heroically hazarding their lives in defence of our freedom and our very existence.

All Contributions should be sent to the Headquarters Collections Committee, Room 99, 83, Pall Mall, and cheques made payable to Lord Rothschild.

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Agricultural Students' Gazette.

Vol. XVII. APRIL, 1915. No. 3.

ROLL OF HONOUR.

PAST AND PRESENT STUDENTS AND MEMBERS OF THE STAFF OF THE R.A.C. WITH H.M. FORCES, 1914-15.

Corrections and additions will be welcomed by the Editor.

S.—Service Battalions. *T.*—Territorial Forces. R.—Special Reserve.
O.T.C.—Officers' Training Corps, R.A.C.

Alderson-Archer, S. F., Capt., Reserve of Officers (R.G.A.). General Staff Officer, Second Grade.

(*T.*) Anderson, R. G., 2nd Lieut., Royal Gloucestershire Hussars Yeomanry.

(*S.*) Arden, A. C., 2nd Lieut., Army Service Corps.

(*T.*) Ashton, S. E., Capt., Cheshire Yeomanry.

Bailey, Hon. G. Sergisson, 2nd Lieut., Grenadier Guards.

(*T.*) Baring, A. F. C., Lieut., 7th (Cyclist) Batt. Devonshire Regt.

(*T.*) Bathurst, Hon. B., M.R.A.C., Lieut.-Col., O.C., 5th Batt. (Reserve) Gloucestershire Regiment.

(*R.*) Bathurst, C., M.R.A.C., Capt., Royal Monmouthshire R.E. (Governor of R.A.C.)

(*T.*) Beardsley, H. H., M.R.A.C., Inns of Court O.T.C.

Bell, H. P., Lieut.-Col., Indian Army.

(*T.*) Birchenough, R. P., 2nd Lieut., Derbyshire Yeomanry.

(*S.*) Blaauw, H. T., M.R.A.C., Lieut., 2nd Sportsmen's Batt. (24th Royal Fusiliers).

Brand, Hon. R., Capt., 5th Rifle Brigade.

(*S.*) Bretherton, W., Sportsmen's Battalion (Royal Fusiliers).

(*R.*) Brewster, K. W., (*O.T.C.*) 2nd Lieut., 6th Batt. Royal Fusiliers.

(*T.*) Brigg, J. H., 2nd Lieut., Bedfordshire Yeomanry.

(*T.*) Burke, J. M. (*O.T.C.*), Royal Engineers.

Burne, L. G. L., Capt., Indian Army.

(*T.*) Busk, J., 2nd Lieut., Dorsetshire Yeomanry.

(*S.*) Butt, G. W. T., 2nd Lieut., 8th Batt. Shropshire Light Infantry.

(*T.*) Calvert, H. M., Lieut., Royal Gloucestershire Hussars Yeomanry.

Carlyon, G., Major, Reserve of Officers, S. Lancs. Regt.

(*R.*) Charlton, St. J. A., Lieut., 4th Batt. Bedfordshire Regt. Killed in action.

Christie, William Charles, Major, Royal Warwickshire Regt., Adjutant R.A.C. O.T.C. Killed in action. Twice mentioned in despatches.

Clapham, T. B., Lieut., Van Deventer's Horse.

Clive, P. A., M.P., Capt., Reserve of Officers, Grenadier Guards. Legion d' Honneur.

(*R.*) Clyne, C., Capt., Royal Warwickshire Regt.

Cochrane, W. O'G., Lieut., R.N.

(*T.*) Coles, R. H., M.R.A.C., 2nd Lieut., W. Somerset Yeomanry.

Collins, M. E. T., British Columbian Mounted Rifles.

(*T.*) Comely, C., M.R.A.C. (*O.T.C.*), 2nd Lieut., 2nd Batt. Monmouthshire Regt.

(*T.*) Comely, R. B., M.R.A.C. (*O.T.C.*), 2nd Lieut., 2nd Batt. Monmouthshire Regt. Wounded.

(*T.*) Cox, D. H., 2nd Lieut., Scottish Horse.

(*R.*) Crawshay, O. T. R., Capt., W. Riding Regt.

(*T.*) Creyke, E. R., Lieut., 5th Batt. King's Own Yorkshire L.I.

(*S.*) Cronan, E. J. H., M.R.A.C. (*O.T.C.*), 2nd Lieut., 11th Batt. Royal Fusiliers.

Davy, R. M. M., Capt., Reserve of Officers, Gloucestershire Regt. Adjutant No. 1 Infantry Base Depôt.

(*S.*) de Halpert, R. V., Lieut. R.N., 2nd Lieut., Infantry. Interpreter with the Indian Expeditionary Force.

(*R.*) de Trafford, R. F., M.R.A.C. (*O.T.C.*), 2nd Lieut., 3rd Batt. King's Own Lancaster Regt.

(*T.*) Dennis, S., M.R.A.C., 2nd Lieut., Royal Gloucestershire Hussars.

(*S.*) Dobson, G. M., Lieut., 13th Batt. Cheshire Regiment.

(*S.*) Dobson, W. W., Public Schools Battalion.

(*T.*) Done, J. P. C. (*O.T.C.*), Pte., Artists' Rifles.

(*T.*) Douglas, B. (*O.T.C.*), 2nd Lieut., 5th Batt. Gloucestershire Regt.

(*R.*) Downes, V. C., Lieut., 3rd Batt. Bedfordshire Regt. Died of wounds.

(*S.*) Duckworth, A. C., Capt., 5th Reserve Regiment Cavalry.

Duff, R. G. V., Lieut., Reserve of Officers, 2nd Life Guards. Killed in action.

(T.) Duncan, A. C., F.R.C.V.S. (*O.T.C.*), Lieut., Army Veterinary Corps, Royal Gloucestershire Hussars Yeomanry. Professor of Veterinary Science, R.A.C.

(*T.*) Dyer, G. S. (*O.T.C.*), 2nd Lieut., R.F.A.

(*S.*) Ellis, W. O. H. (*O.T.C.*), 2nd Lieut., 13th Batt. Royal Welsh Fusiliers.

(*S.*) Evans, F. F. (*O.T.C.*), 2nd Lieut., 8th Batt. South Wales Borderers.

Filleul, E. E., Dispatch Rider, B.E.A. Force.

(*T.*) Fillingham, G. A., Lieut., S. Nottinghamshire Yeomanry.

(*R.*) Gaisford-St. Lawrence, T. J. E., 2nd Lieut., 3rd Batt. Seaforth Highlanders.
Garside, W. F., formerly Professor Veterinary Science. Veterinary Officer in Charge, R.E. Lines, St. John's Camp, Crowborough.
(*R.*) Gay, W. G. M., 2nd Lieut., 3rd Batt. E. Kent Regt. (The Buffs).
(*T.*) Gibbs, G. M., Lieut., N. Somerset Yeomanry.
(*T.*) Gilliat, F. L. (Lieut., R.N.), Capt., Northamptonshire Yeomanry.
(*S.*) Gilmour, D., 2nd Lieut., 7th Batt. Seaforth Highlanders.
(*S.*) Glossop, B., Lieut., 9th Batt. Devonshire Regt.
(*T.*) Godman, Hubert, Lieut., Yorkshire Hussars Yeomanry.
(*R.*) Goodall, G. M. L., 2nd Lieut., 3rd Batt. East Lancs.
Goodwin, J. H., Dispatch Rider, B.E.A. Force.
(*R.*) Gordon-Duff, L., Capt., 3rd Batt. Gordon Highlanders. Killed in action.
(*R.*) Grant, R. C., 2nd Lieut., 3rd Batt. Cameronians. Wounded.
Grant-Duff, H., Lieut., R.N.
(*S.*) Greenwell, R. E. (*O.T.C.*), Public Schools Battalion.
(*S.*) Grice-Hutchinson, C. G., Lieut., 8th Batt. S. Staffordshire Regt.
Grosvenor, Lord Gerald, Lieut., Scots Guards. Wounded.

(*S.*) Hackett, C. B., Capt., 6th Batt. Leinster Regt.
(*T.*) Handy, J., Sergt., Royal Gloucestershire Hussars Yeomanry. Assistant in Agriculture, R.A.C.
(*T.*) Hartnoll, J., 2nd Lieut., R.H.A.
(*T.*) Harvey, J. S. (*O.T.C.*), Inns of Court O.T.C.
(*R.*) Hathaway, N. R. (*O.T.C.*), 2nd Lieut., Army Service Corps.
(*T.*) Hawdon, C. (*O.T.C.*), 2nd Lieut., 4th Batt. Yorkshire Regt.
Henniker, A. M.
(*T.*) Henry, C. E. F., Capt., Royal Gloucestershire Hussars Yeomanry.

(*S.*) Heydeman, W. E., 2nd Lieut., R.F.A.

(*R.*) Heywood, R. M., 2nd Lieut., 3rd Batt. E. Kent Regt. (The Buffs). Killed in action.

(*T.*) Hicks-Beach, Hon. M. H. [Lord Quenington], M.P. (Governor of R.A.C.), Hon. Lieut. in Army, Lieut. Royal Gloucestershire Hussars Yeomanry.

(*R.*) Hippisley, H. E., M.R.A.C. (*O.T.C.*), 2nd Lieut., 1st Batt. Gloucestershire Regt. Killed in action, October 23rd.

(*T.*) Hissey, R. J., (*O.T.C.*), 2nd Lieut., 5th Batt. Royal Sussex Regt.

Hoare, C. M., Lieut., 15th Hussars. Killed in action.

(*S.*) Hoette, A. R., M.R.A.C., Capt., 12th Batt. York and Lancaster Regt.

(*T.*) Homfray, H. C. R., 2nd Lieut., Glamorgan Yeomanry.

(*S.*) Hook, V. (*O.T.C.*), 2nd Lieut., 7th Batt. W. Surrey Regt.

(*T.*) Hooper, K. A. (*O.T.C.*), British Motor Volunteer Corps.

(*T.*) Hopkinson, A. D. (*O.T.C.*), 2nd Lieut., 4th Batt. Gordon Highlanders. Lecturer in Forestry, R.A.C.

(*T.*) Iredale, E. A., M.R.A.C., Capt., 5th Border Regt.

(*T.*) J'Aimay, I. B., Capt., Cheshire Yeomanry.

Jeffery, C. G., Capt., 2nd Batt. Yorkshire Regiment. Died from wounds received in action.

(*T.*) Jeudwine, J. H. W., Capt., 3rd West Riding Brigade, R.F.A.

(*T.*) Johnson, J. G. T., 2nd Lieut., Derbyshire Yeomanry.

(*S.*) Johnson, R. H. K. (*O.T.C.*), 2nd Lieut., Duke of Cornwall's Light Infantry.

(*T.*) Joynson, C., 2nd Lieut., Warwickshire Yeomanry.

Keane, Sir J., Bart., Capt., Reserve of Officers, R.F.A.

(*T.*) Kearney, J. J., Royal Gloucestershire Hussars Yeomanry.

(*R.*) Kershaw, M. (*O.T.C.*), 2nd Lieut., 1st Batt. Gloucestershire Regt. O.C. R. A. College O.T.C. Lecturer in Physics, R.A.C. Missing November 7th.

King, W., Royal Flying Corps.

Lace, W. H. (*O.T.C.*), Motor Ambulance Driver. Croix Rouge Francaise.

Lane, G. W. B. (*O.T.C.*), Motor Cycle Dispatch Rider, R.E.

Lascelles, H. F., M.R.A.C. (*O.T.C.*), East African Force.

(*T.*) Lawson, G., Capt., Westmoreland and Cumberland Yeomanry.

(*T.*) Lees, E. B., Major, Westmoreland and Cumberland Yeomanry.

(*S.*) Llewellin, C. E. (*O.T.C.*), 2nd Lieut., 7th Batt. Wilts Regiment.

Loring, W. L., formerly Adjutant O.T.C.—R.A.C., Lieut.-Col., R. Warwickshire Regt. Killed in action. Mentioned in despatches.

(*S.*) Macintyre, D., 2nd Lieut., R.F.A.

(*R.*) Mansel-Pleydell, E. M. (*O.T.C.*), 2nd Lieut., 3rd Batt. Dorset Regt. Killed in action.

Margesson, E. W., Major, Reserve of Officers, 3rd Batt. Norfolk Regt.

(*S.*) Mathews, H. S., M.R.A.C., Lieut., 14th Batt. Royal Warwickshire Regt.

(*R.*) Mathias, A. S., M.R.A.C., Lieut., Army Veterinary Corps.

(*S.*) Meysey-Thompson, A. de C. C., 2nd Lieut., 7th Batt. Rifle Brigade.

(*T.*) Mitchell, F. A., 2nd Lieut., Royal Gloucestershire Hussars Yeomanry.

(*S.*) Mitton, H. (Cy. Sergt.-Major), Capt., 5th Batt. Northants Regt.

(*T.*) Monckton, R. F. P., 2nd Lieut., Montgomeryshire Yeomanry.

(*T.*) Morris-Eyton, R. E., Lieut., 2nd N. Midland Brigade R.F.A.

(*T.*) Mowat, J. G. (*O.T.C.*), 2nd Lieut., 4th Batt. W. Riding Regt.

(*T.*) Murland, J. M. G. (*O.T.C.*), Lieut., Northants Yeomanry.

(*S.*) Murdoch, F. (*O.T.C.*), Public Schools Battalion.

(*T.*) Neilson, W. P., 2nd Lieut., Scottish Horse.

Northen, H. A.

(*R.*) Northey, G. E. A., Lieut., 3rd Batt. Essex Regt. Wounded and missing.

(*R.*) O'Donovan, M. H. (*O.T.C.*), 2nd Lieut., 4th Batt. Royal Munster Fusiliers.

Parker, W. H., M.R.A.C.

(*R.*) Pease, G. B. R., 2nd Lieut., R.F.A.

(*S.*) Pennington, R. W., M.R.A.C. (*O.T.C.*), Public Schools Battalion.

(*T.*) Pepper, W., Lieut., Oxfordshire Yeomanry.

(*T.*) Perkin, A. L. D., 2nd Lieut., 8th Batt. Middlesex Regt.

(*S.*) Phillips, A. H. R. (*O.T.C.*), 2nd Lieut., Army Service Corps.

(*S.*) Phipps, R. G. (*O.T.C.*), Public Schools Batt.

(*S.*) Pickering, F. H. C. (*O.T.C.*), 2nd Lieut., 5th Batt. Northants Regt.

(*T.*) Rankin, E. C., 2nd Lieut., Royal Gloucestershire Hussars Yeomanry.

(*T.*) Rodd, E. F. S., Capt., W. Somerset Yeomanry.

(*T.*) Roper, C. R. (*O.T.C.*), 2nd Lieut., 6th Batt. Hampshire Regt.

(*S.*) Saunderson, J. V., Lieut., R.F.A.

(*S.*) Seaton-Winton, Alan, Capt., 12th Batt. Argyll and Sutherland Highlanders.

Shann, R. A. (*O.T.C.*)

Skipwith, P. A., Major, Reserve of Officers, R.F.A. Commandant of Remount Depôt, Bangalore, India.

(*R.*) Smith-Barry, R. R., 2nd Lieut., Royal Flying Corps. Severely injured.

(*R.*) Spooner, W. P., Lieut., 3rd Batt. Essex Regt.

(*T.*) Spurrier, J. M., 2nd Lieut., 4th North Midland Brigade, R.F.A.

(*S.*) Staples, E. G., M.R.A.C. (*O.T.C.*), 2nd Lieut., 4th Batt. S.W. Borderers.

(*T.*) Stenhouse, V. D., M.R.A.C., Major, West Somerset Yeomanry.

(*R.*) Stewart, R. J., 2nd Lieut., 3rd Batt. The Royal Scots (Lothian Regiment).
(*R.*) Stirling, J., Capt., 1st Batt. Cameronians (Scottish Rifles). Killed in action; reported January 8th.
(*R.*) Sudbury, A. H. V., 2nd Lieut., 3rd Batt. Royal Sussex Regt.
(*R.*) Swanwick, R. Kenneth (*O.T.C.*), Lieut., 1st Batt. Gloucestershire Regt. Killed in action.
(*S.*) Symons, G. G., M.R.A.C., Public Schools Battalion.

(*T.*) Thomas, H. J., 2nd Lieut., Oxfordshire Yeomanry.
(*S.*) Trusted, G. R. (*O.T.C.*), Public Schools Batt.

(*S.*) Vaughan, E. Brettel, M.R.A.C., Sergt-Major, 7th Batt. Queen's Royal West Surrey Regiment.
(*T.*) Verel, J. R., Motor Cyclist in Lovat's Scouts.
(*T.*) Vernon, S. R., M.R.A.C., Capt., 4th Batt. Oxfordshire and Bucks Light Infantry.

(*S.*) Walford, E., M.R.A.C., Public Schools Battalion.
(*T.*) Wardlaw, A. L., Motor Cyclist in Lovat's Scouts.
(*R.*) Watson, H. T., Capt., 3rd Batt. Liverpool Regiment. Died of wounds in Belgium, March 6th.
(*T.*) Weigall, W. E. G. A., M.P., M.R.A.C., Captain, Lincolnshire Yeomanry.
White, Cecil L., M.R.A.C., Alexandria Light Horse.
(*S.*) Williamson, E. B. (*O.T.C.*), Public Schools Battalion.
(*S.*) Wilson, E. B., M.R.A.C., Captain, 6th King's Own Yorkshire Light Infantry.
(*T.*) Wilson, Gordon Jacob, 2nd Lieut., Northamptonshire Yeomanry. Killed in action, March 12th.
(*T.*) Wilson, R. W., 2nd Lieut., W. Somerset Yeomanry.

The following, among others, are serving in the Armies of our Allies:

le Gentil, Jacques, Marechal de Loges, 9th Regt. Cuirassiers, French Army.
Sintier, Georges, Lieut., French Field Artillery.
von Meck, Marc, Lieut., Russian Cavalry.

MEMBERS OF THE R. A. COLLEGE CONTINGENT OF THE OFFICERS TRAINING CORPS.

Captain—J. R. Ainsworth-Davis.

Second Lieutenant—C. B. Saunders.

Sergeant—J. M. Rayden.

Corporals.

G. de Coundouroff. A. S. Patten.

Lance-Corporal—I. V. Douglas.

Cadets.

A. H. Brown.
P. Buckle.
P. Degiardé.
T. C. Dickie.
J. W. Farmer.
H. C. Jackman.

Cadets, Town Members.

H. J. Clappen.
T. L. Jones.
H. M. Lewis.
Raymond Matthews.
G. S. Sutton.

KILLED IN ACTION OR DIED OF WOUNDS.

Lieutenant St. John Alan Charlton, of the 4th Battalion Bedfordshire Regiment, Student of the R.A.C. 1913—14, was killed in action on October 25—26. He was appointed to the Regiment in December, 1911, and was a well known follower of the Cheshire Hounds. Charlton will be remembered as a promoter of College social life, especially as an actor of marked ability. Aged 24.

Major William Charles Christie, of the Royal Warwickshire Regiment, was killed in action at Meteren on October 13th, a victim of white flag treachery. After being hit five times, his last words were—" Never mind me, my boys ! Look after yourselves ! " He was educated at Rugby, where he proved himself a first-class all-round athlete. He kept up his interest and keenness in sport and sports throughout his career, and was a well-known and successful steeplechase rider. He served in the Soudan expedition of 1898, and in the South African War. Major Christie was Adjutant of the R.A.C. Officers Training Corps from October, 1912, till the outbreak of the war, and did much to advance its efficiency and popularity. He was loved by all with whom he came in contact; in his death the country loses a typical gentleman, a true sportsman, a splendid soldier. Aged 42.

Lieutenant Villiers Chernocke DOWNES, of the 3rd Battalion Bedfordshire Regiment, a Student of the R.A.C., 1912—13, was wounded, and died of his wounds in hospital at Saint Omer in October. Aged 23.

Lieutenant Robert George Vivian DUFF, Reserve of Officers, 2nd Life Guards, Student of the R.A.C. 1896—97, is reported killed in action. Aged 37.

Captain Lachlan GORDON-DUFF, of the 3rd Battalion Gordon Highlanders, a Student of the R.A.C. 1909—1911, was killed in action on October 24th. He was the eldest son of Thomas Duff Gordon-Duff, of Park and Drummuir, Banffshire, his mother was the second daughter of the late Sir Charles Tennant. Captain Gordon-Duff served through the South African War with the Gordon Highlanders, and received the Queen's Medal with five clasps and the King's medal with two clasps. He was an accomplished and dashing rider, and among numerous other achievements won the Challenge Cup for the R.A.C. Students' Race at the R.A.C. Point-to-Point Races, 1911. He was a member of the College Military Education Committee. Aged 34.

Second-Lieutenant Harold Edwin HIPPISLEY, M.R.A.C. (Special Reserve), of the 1st Battalion Gloucestershire Regiment, was killed in action on October 23rd. Hippisley was a good student of the R.A.C., he entered in 1909, took scholarships most terms and the Diploma of Membership in July, 1912, with the Haygarth Gold Medal. He was in the Cricket XI., 1910, 1911, and 1912, being Captain during the latter two seasons. He was a brilliant bat and splendid field. He was in the Football XV. for 1909, 1910, and 1911, and was a great help to the Hockey team. After leaving the College he played cricket for Somerset, and hockey for the Western Counties. His home was at Wells, Somerset. He met his death bravely doing his duty, his flank platoon being in a difficult position to which he stuck and probably saved the situation. Another 2nd Lieutenant in the same Battalion was killed and buried at the same time as Hippisley ; Lieutenant Kershaw was in the same Company. We understand that the Brigadier spoke very feelingly to the regiment, on the next morning, of the work they had carried out. Aged 24.

Charles M. Hoare. Student R.A.C. 1911—12. Lieutenant in the 15th Hussars, was reported killed early in the war, his squadron coming under machine gun fire in a village. Cricket XI., 1911. Aged 21.

Captain Claud Giffard Jeffery, R.A.C. 1898, of the Alexandra, Princess of Wales' Own Yorkshire Regiment, was educated at Bradford Grammar School, and was at the R.A.C. the whole of 1898. He attained his Captaincy in 1909. He was wounded in action on October 23rd, and subsequently died. He served in the South African War, 1900-1, and was awarded a Queen's medal with 6 clasps. Recently he served two years in the Egyptian Army.

Lieutenant-Colonel Walter Latham Loring, of the Royal Warwickshire Regiment, was killed in action, October 24th. He came of a soldiering stock, being of the same family as Sir Nigel Loring, immortalized by Conan Doyle in "The White Company." His near kinsman, John Loring, was a student at the R.A.C. 1880—81. He became Captain in 1898, Major in 1904. Whilst Major he was Adjutant to the newly formed R.A.C. Officers Training Corps from 1910 till October, 1912, when he rejoined his Regiment and became Lieutenant-Colonel. He served in the South African War with the Mounted Infantry. At the R.A.C. he was of great use to the Cadets, and much respected for his carefulness and kindliness. Colonel Loring was struck on the foot by shrapnel, but refused to go to hospital : after his wound was bound up he continued to lead on horseback, and therefore was more exposed ; two chargers were killed under him. Aged 46.

Lieutenant Russell Kenneth Swanwick (Special Reserve), of the 1st Battalion Gloucestershire Regiment. Student R.A.C. 1908—09. Lieutenant Swanwick was killed during the battle of the Aisne, near

Noyou, on September 14th. He was buried by an Army Chaplain at the village of Troyons. The third son of Mr. Russell Swanwick of the Royal Agricultural College, Kenneth Swanwick was well known to several generations of College Students and Staff. He was a keen sportsman, well known as a rider of unusual pluck and judgment both to hounds and in our Point-to-Point races: he gave himself to his military duties with enthusiasm, and became very popular in his regiment and respected and loved by the men under him. At the last he was cheering his men on regardless of his own wounds. Aged 30.

Second Lieutenant Robert Myles HEYWOOD, died, on February 15th, of wounds received in action in France. He was the only son of Mr. and Mrs. Robert Heywood, of Hales Hall, Cheadle, Staffordshire. He was appointed to the reserve of the East Kent Regiment (The Buffs) in August last. Heywood was at the R.A.C. 1912 and 1913, and in the Cricket XI. each of these years, being Captain in 1913. He was an exceedingly pretty bat, especially on a fast wicket, and a good field, particularly at cover or extra cover: he was a great help to the team, and head of the batting averages in 1913. Aged 30.

Second-Lieutenant Edmund Morton MANSEL-PLEYDELL, 3rd Battalion Dorset Regiment, is reported killed on March 14th. He was the eldest son and heir of Colonel E. M. Mansel-Pleydell, of Whatcombe, Dorset, and had but recently succeeded to the estates. E. M. Mansel-Pleydell was at the R.A.C. 1908—1910, and specially distinguished himself in the Football field. He was in the XV. in 1908 and was Captain in 1909; he thoroughly understood the game, and by his untiring energy and enthusiasm raised the standard of efficiency of our team during the year of his captaincy to a high level. He was in the Cricket XI. in 1909 and 1910, and was a steady useful bat. When the O.T.C. was formed he was an active member and quickly became Lieutenant. Mansel-Pleydell was a great favourite with those who met him in his activities. He was gazetted in August to the Dorset Regiment, but on arriving in France he was transferred to the 3rd Battalion Worcester Regiment, and fell leading his platoon on the first day he went into action. Aged 28.

Captain James **Stirling** (R.A.C. 1911—12), of the 1st Battalion Cameronians (Scottish Rifles), was reported as killed in action on January 8th ; he was the eldest son of Colonel Stirling, R.A., and was educated at Wellington College and Sandhurst (1902). He was gazetted second lieutenant in the 2nd Battalion Scottish Rifles in 1903 ; retired in 1911, and rejoined from the Special Reserve on the outbreak of the war, to the 3rd Battalion, but was attached to the 1st Battalion at the time of his death. Captain Stirling took our one year course, and was much liked and respected by Staff and Students. He was an indefatigable worker and profited greatly by his time at the College. His Commanding Officer said of him that he had never known a more conscientious or efficient officer or one that he could trust more than the late Captain Stirling ; and testified that many would share with him the personal grief which he feels at the loss of a true friend. Born in 1884.

Captain Henry Trelss **Watson**, M.R.A.C., of the 3rd King's Liverpool Regiment, died, in Belgium, of wounds on March 6th. He was the third son of the late Rev. John Watson, D.D. (" Ian Maclaren "), of Liverpool, and was educated at Sedbergh School and at the R.A.C., Cirencester, where he took the Diploma in 1905 ; he was in the Football XV. in 1903, and rode in the College Point-to-Point Race in 1905. He was in the Special Reserve of Officers and attached to the 2nd Yorkshire Light Infantry, and was mentioned in Sir John French's dispatches. Born September 13th, 1883.

Second-Lieutenant Gordon Jacob **Wilson**, of the Northamptonshire Yeomanry, was killed in action on March 12th. He was educated at Haileybury, and a student of the R.A.C. in 1900 and 1901 ; he was in the Football XV. of those years. Lieut. Wilson was the youngest son of the late Sir Jacob Wilson who took the Diploma of the R.A.C. in 1855. Born 1883.

MISSING.

Second Lieutenant Milton **Kershaw**, of Cleckheaton, Yorkshire, born January, 1886. Educated at Bradford Grammar School, 1897—1905, and Peterhouse College, Cambridge, 1905—1908. B.A. Camb. ; Agricultural Dipl. Camb., 2nd Class Honours Nat. Sc. Tripos in Chemistry, Physics, Botany, and Geology. First Assistant to Professor of Chemistry, Lecturer on Physics and Meteorology at R.A.C. from January, 1909, to August, 1914.

Mr. Kershaw was a member of the R.A.C. O.T.C. from its inception in 1909, and was its Commanding Officer at the out-break of the war, when he left for service in France.

Kershaw was a great help to the Games and Sports as well as otherwise assisting in promoting the social life of the College. He belonged to the Football XV. for four years, but was obliged to stop playing in 1913 on account of an injury to his knee ; he was the mainstay of the three-quarter line ; he was in the Cricket XI. during his whole time at the R.A.C., and in 1914 was Captain ; he was a capital fast bowler, and was head of the bowling averages most of his years, a very good field, and a very useful bat, being generally second in the batting averages, all round he was a great help to the XI. and often pulled it out of straits. As a member of the Sports Committee and Timekeeper at the Sports his services were always sought and freely given. In every way, in the classroom, in the laboratory, and on the cricket field and on the football field Kershaw was a real help to the R.A.C.

He left with the Gloucesters early in August and was with the advance to and retirement from Mons, a very trying time and very hard work in the heat of August and September. His letters to his colleagues on the Staff of the R.A.C. showed that he was always in good health and spirits and well supplied with food, though there were concomitant hardships. He was reported missing as from November 7th, and known to be wounded.

A brother officer wrote on Nov. 26th, that " he went out with his company in a fog one morning and found when it cleared that he had advanced much closer to the German trenches than he had intended, in fact he was almost surrounded. From what I can gather he lay there with his men, hoping to crawl away at dusk. He was then wounded in the leg and tried to retire, and then they tell me he was shot through the head. . . . A search was made for him at dark before the Regiment had to withdraw, but without success. There is a faint hope that his wound in the head may not have been fatal, but I am afraid it is very slight, he would have been able to communicate with you by this time if that had been the case."

Another brother officer (M.R.A.C.), writing from the Front on February 6th, says "All the officers and men of the Regiment speak so highly of Kershaw, Swanwick, and Hippisley. I am afraid by what I am told there is practically no hope of poor Kershaw being alive."

THE SOLDIER.

If I should die, think only this of me:
That there's some corner of a foreign field
That is for ever England. There shall be
In that rich earth a richer dust concealed;
A dust whom England bore, shaped, made aware,
Gave, once, her flowers to love, her way to roam,
A body of England's, breathing English air,
Washed by the rivers, blest by suns of home.

And think, this heart, all evil shed away,
A pulse in the eternal mind, no less
Gives somewhere back the thoughts by England given;
Her sights and sounds; dreams happy as her day;
And laughter, learnt of friends; and gentleness,
In hearts at peace, under an English heaven.

RUPERT BROOKE, in *New Numbers*, No. 4,
December 1914.

SOME NOTES ON THE COTTON BOLL WEEVIL (*Anthonomus grandis. Boh*).

By G. H. CORBETT, B.Sc. (Edin.).

HISTORY.

There is very little certainty regarding the history of the Mexican cotton boll weevil (*Anthonomus grandis. Boh.*) before its presence in Texas came to the attention of the Division of Entomology in 1894. The first official record of the injury to cotton by this weevil was in

1885, when specimens were sent to Dr. C. V. Riley, then entomologist of the Department of Agriculture. These specimens were from northern Mexico. After the American occupation of Cuba, the boll weevil began to attract considerable attention in that island. In 1902 it was observed that the weevil was quite injurious to cotton at Cayamas, Cuba. This place was visited by Mr. E. A. Schwarz, of the Bureau of Entomology, in the spring of 1903. He found that the native food plants of the weevil in Cuba were the " wild " or " loose " cotton (*Gossypium brasiliense*) and the native " kidney " cotton—both tree cottons. The spread of the boll weevil in Mexico appears to have begun prior to 1892. It probably crossed the Rio Grande at Brownsville, Texas, before 1892. At any rate, during that year it caused considerable loss at Brownsville. In 1894, it had spread to half a dozen counties in the Brownsville region, and during the last months of the year was brought to the attention of the Bureau of Entomology as an important enemy of cotton. Mr. C. H. I. Townsend was immediately sent to the territory affected to investigate the insect. It is much to be regretted that, at that time, the State of Texas did not adopt the suggestion made by the Bureau of Entomology, that a belt be established along the Rio Grande in which the cultivation of cotton should be prohibited, and the advance of the insect thus cut off. Events have verified the predictions of the Bureau of Entomology as to the advance made, and the damage caused by the insect.

The weevil is now found in the following States : Texas, Alabama, Arkansas, Mississippi, Louisiana, Florida, and possibly Georgia.

The weevil reached, in the fall of 1913, a point about six miles from the Georgia border. It extends its range, on an average, sixty-five miles per year, and it was deducted from this that the weevil would enter the extreme western part of Georgia during the season of 1914.

During the month of September, 1914, accompanied by Mr. W. Dwight Pierce, of the Bureau of Entomology, I was introduced to boll weevil dispersion work, which consists of mapping out a line to show the advance, retreat, and extent of the weevil infested area. It was found, at that time, that the weevil, instead of crossing the river into Georgia, had retreated twelve miles. Writing to me concerning the boll weevil on November 7, 1914, Mr. W. D. Hunter, of the Bureau of Entomology, who is in charge of the Southern Field Crop Insect Investigations, says :—

" Regarding the line for 1914 the most definite statement possible at this time is that the advance has been rather uniform to a distance of about twenty miles. The State of Georgia has not been invaded, but last report was that the insect had been found within two miles of the border. There is little doubt that the later movement will carry the weevil into this State.

Many estimates have been made of the loss to growers caused by the boll weevil. The Bureau of Entomology estimate the loss in Texas for 1903 at $15,000,000 ; for 1904 at $22,000,000 ; and for 1909 at $88,056,500 ; and though the acreage under cotton in this State has been nearly doubled during the period 1899-1911 the total yield has remained almost constant owing to the ravages of the weevil.

In Mississippi, in 1907, the year before the advent of the weevil there, the crop in seven selected counties was 191,790 bales ; in 1909, when the weevil had become established, the crop fell to 89,577 bales, in 1910 to 61,432 bales, in 1911 to 37,816 bales, and in 1912 to 30,809 bales ; and on the supposition that, but for the weevil, the crops of these four seasons would have averaged as large as that of 1907, the loss may be valued at $34,000,000 in these seven counties alone.

And these figures do not show in full the evil effect of the invasion, for besides the great decrease in the quantity of cotton produced, there has been a far-reaching influence in the social and economic life of these areas, amounting almost to panic. Many farmers have abandoned entirely the attempt to produce cotton or have reduced the area under this crop to a minimum, and consequently very large numbers of negro labourers have lost their employment and have had to emigrate to other places. And of course there has been a large depreciation in land values.

PROSPECTS.

The spread of the weevil in the past few years and its apparent adaptability to most of the conditions prevalent in the cotton belt of the U.S.A. indicates that it will ultimately be able to exist throughout the entire cotton growing area with the exception of the semi-arid districts.

At the end of 1910 the total area infested was 268,000 square miles, a net gain of 14,200 square miles over 1909. Including 1910, the average rate of movement in the U.S.A. beginning with 1904 has been 27,000 square miles a year, with 402,000 square miles of cotton producing area yet free. It is therefore reasonable to estimate that it will take at least 15 years before the entire cotton region of this country can become infested.

It is certain, however, that the weevil will find definite checks in the entire growing regions of this country. Among the more important checks are (1) dryness, (2) low winter temperatures, and (3) altitude.

Dryness is the most important check the boll weevil experiences. The insect has repeatedly advanced into Western Texas, but has invariably been prevented from gaining a foothold by the dry climate of that region. Occasional wet seasons have resulted in its advance in that quarter, but the effect has been nullified by the recurrence of normal years. The occasional recurrence of a dry summer, however, does not give any promise of future immunity from the boll weevil, because its tendency to disperse in the fall in all directions enables it to regain any ground which it might have lost during such a season. It is also important to note that the practice of irrigation in dry regions may counteract the effects of the lack of precipitation, and enable the weevil not only to maintain itself, but to cause considerable damage.

The low temperatures of the winters of 1907, 1908, and 1909 had a very pronounced effect upon the numbers of the weevil in the following years. An analysis of the minimum temperatures reached in the regions where the weevils were most affected indicates that such control was the result of a temperature of 12° F. In some places where this temperature was reached, there were earlier low temperatures which may have forced the weevils into considerably more secure shelter than they would otherwise have selected. This apparently enabled the weevils to survive a temperature of 5° F.

There is some hope that regions, having a minimum temperature of from 5 degrees to 10 degrees above zero F., will have little trouble with the boll weevil. The weakness in such a prediction is that no account is taken of the fact that the weevil is rapidly adjusting itself to changed conditions, and that eventually the result of natural selection will be a class of weevils which can withstand greater vicissitudes than those of the present.

The extremely slow progress in Western Texas might be explained on the basis of altitude. So far, the weevil has not established itself at an altitude of more than 2,000 feet. It may be possible that this altitude is its extreme limit. Again, there is danger in this assumption because the boll weevil may be able to adapt itself to higher altitudes than it has yet reached.

In this connection it becomes of some interest to speculate as to the possibility that the weevil may eventually be carried outside of the United States and gain a foothold in other cotton-producing countries. The fact that the insect is rather rapidly adapting itself to conditions in the United States that are quite adverse to those of its native home leads to the supposition that it would experience little difficulty in adapting itself to conditions wherever cotton may be grown. This probability is increased by the fact that cotton seed for planting purposes, which may include weevils, is frequently shipped by the United States to various parts of the globe. In the dormant condition in which they hibernate, they have been known to go longer without food than is ordinarily required for freight shipment from Galveston, Texas, to Cape Town. Although there are no truly cosmopolitan cotton insects, it seems likely that the boll weevil may eventually be more widely distributed than any other.

General Description and Life History of the Weevil.

The small glossy white egg of the boll weevil is deposited in a cavity formed by the weevil eating into a square, which is the flower bud, or boll, which is the fruit. The egg hatches in a few days, and the white footless grub begins to feed on the inner tissues of the square or boll making a larger place for itself as it grows. During its growth, the larva sheds its skin at least three times, the third moult being at the formation of the pupa, which after a few days sheds its skin, whereupon the transformation is completed. Each immature stage requires on the average between two and three weeks. A further period of feeding equal to one-third of the previous developmental period is required to attain sexual maturity.

Variation in size depends directly upon the abundance and condition of the food supply. Weevils of average size are about 8mm. in length, one-third as broad as long, and weigh about one-quarter of a grain. Colour varies as widely as does size. It is usually of a grey or yellowish brown, being most markedly yellow in the largest weevils. Sexes are produced in practically equal numbers, males predominating slightly. No other food has been found which will attract the weevils from squares, and no plant but cotton upon which they can sustain themselves for any considerable length of time, unless it be Thurberia, the most closely related of all plants to the cotton plant.

The boll weevil spends the winter in the adult stage, and seeks hibernation quarters in the fall, at the approach of cold weather. A period of temperatures below 56 degrees F. will send the weevils into hibernation. Any place affording the slightest shelter will be sought by the hibernating weevils: old cotton stalks, dead leaves, and rubbish of all kinds, fence corners, boards, logs, and Spanish moss. The last—a moss growing abundantly on trees—is exceptionally favourable. The milder the winter the more weevils survive to attack the cotton in the spring. In the spring, a temperature of 57° F. will start some of the weevils in search of food, but the majority remain inactive until an average temperature of from 64 degrees to 68 degrees has been reached.

The condition of the cotton plants at the time of the weevils' emergence determines their first feeding habits. The first to emerge feed upon the young seedlings and puncture the stem at or just below the attachment of the seed leaves, and these early attacks are usually very injurious. When the cotton has put out its first true leaves it is not apt to be killed by the weevils, although it may be more or less retarded in its growth. The weevils feed upon the tender growing shoots and new leaves until the first squares appear, but after the first meal in the squares they seldom attack the stem of the plant, seeming to prefer the new diet. The injury of the feeding puncture varies in extent, but when many such holes are made in one square it is generally killed. Others are prevented from blooming by a single puncture, and many are distorted, producing imperfect bolls. Soon after the formation of squares the weevils begin to deposit their eggs. The number of eggs laid by female weevils varies greatly, the average being probably about 100. More eggs are laid on warm than cold days, and the usual number is from 1—5 per day.

The issue of the squares at once proceeds to heal the wound, and the sealing substance secreted by the weevil seems to stimulate the growth of the plant tissue. As a consequence the egg puncture is almost invariably evidenced by a wart-like protuberance on the side of the square.

One of the first effects of egg deposition is the flaring of the square, that is, the bracts, which normally close tightly about the bud, spread apart and expose it, and this usually occurs six or seven days after the egg has been deposited. The next effect is the falling of the square, which happens about ten days after the egg has been laid. Immediately upon hatching, the larva begins to feed upon the immature pollen in the centre of the square. The larva is about half-grown before his food is exhausted. It then feeds on the pistil and other tissues of the bud.

Many eggs are also laid in the bolls, and the larvae from these eggs feed on the seeds, and occasionally on the immature fibre. Usually one lock of the boll is injured, unless, as often happens, more than one egg is deposited in a boll.

As the larva reaches full size, it forms about itself a hard cell composed of excrement and a cast larval skin. In this cell the larva sheds its skin for the third time, and transforms into a pupa.

The length of the various stages—egg, larva, pupa, and imago—of the weevil varies considerably, the variation being caused chiefly by different temperatures. The average length of time from oviposition by the female of one generation to oviposition of the next succeeding generation is 56 days. It has been found that as many as ten generations are possible from the first eggs laid in the spring.

There is no special generation of weevils which hibernates, and weevils of any or all generations that are strong and active seek hibernating quarters on the approach of cold weather.

During the spring and summer there is a more or less continual flight of weevils from plant to plant and from field to field. The general flight of weevils does not take place, however, until the fall, and then large numbers of weevils make flights of considerable length. The primary cause of this general flight is lack of food caused by an overabundance of weevils in one country. There also seems to be a general feeling of restlessness upon the part of the weevils which causes them to seek new feeding ground at this season of the year. The annual extension of the area infested by the weevil takes place during this fall flight, and in this way weevils have invaded new territory for an average distance of 65 miles per year. On the approach of cold weather, still another flight of weevils takes place, and this time they are in search of winter quarters, and this is known as the hibernation flight.

POSSIBLE ANNUAL PROGENY OF ONE PAIR OF HIBERNATED WEEVILS.

The average number of eggs deposited by a female is 100. The average period of development for each generation is 19 days. The average period between emergence of adult and deposition of the first eggs is six days. The average period for the deposition of one half of the eggs for each generation is 18 days, thus making the average period for each generation 43 days. The sexes are produced in approximately equal numbers. Allowance has been made for only four generations in a season.

							Weevils.
First	generation	average	adult	June 29,	numbering	...	100
Second	,,	,,	,,	Aug. 10	,,	...	5,000
Third	,,	,,	,,	Sept. 22	,,	...	250,000
Fourth	,,	,,	,,	Nov. 4	,,	...	12,500,000
							12,755,100

As a matter of fact the multiplication is, during the early part of the season, so much more rapid that it is very certain that a large part of the third generation becomes adult by the middle of August.

Natural control of the weevil is exercised by climate, as previously noted; by birds, of which 53 species are known to feed on adult weevils; by insects, either predacious or parasitic, of which 54 species attack the weevil; and by proliferation, which is a term applied to the crushing of eggs and young larvae by the increased growth of tissue due to irritation at the point of injury in the plant. (Varieties showing tendency to proliferate should be planted, if the bearing qualities are equal.)

Turning now to human control, the ordinary methods of dealing with insects, applying poisonous or caustic sprays or dust, have failed with the boll weevil, as it lives within the buds and cannot be reached; but cultural methods, such as destroying stalks in the fall, picking of fallen squares, clean cultivation, suitable rotation, early planting and varieties, and efficient manuring, have been found effective.

While admitting that nothing so far as now known seems certain to prevent the spread of the weevil to any latitude where cotton is now grown, it does seem probable that its control may be more easily accomplished in the more northern portions of the cotton belt than in the Texas area now infested; and since it has been demonstrated that more than an average crop may be grown here in spite of the depredations of the weevil there would seem to be no special reason for a panic over the cotton crop. For cotton has been, and still will be, grown in spite of the weevil, and if planters enter the struggle with determination, and adopt the advanced methods which have proved successful wherever tried, they will realise almost as large a profit as was possible before the advent of the weevil. In fact the solution of the cotton boll weevil problem, like that of many other insect pests, is no more nor less than good farming.

LIGHT HORSES.

As the breeding of light horses is attracting a good deal of attention at the present time amongst landowners, farmers, and those interested in the supply of hunters and army remounts a few lines on the subject may not be out of place in the Magazine of the R.A.C.

Harness horses are less in demand every year owing to the spread of motor traction, although, of course, high prices are, and always will be, given for matched pairs of big and well bred horses suitable for landaus, mail phaetons, and fours in hand. These horses when English mostly come from Yorkshire, but many of the winning teams at Olympia and elsewhere have hailed from the United States, where big high-class harness horses are always in demand.

When at the commencement of the war so many hunters were taken by the British Government for army work, many good judges thought they would be unable to stand the hard work and rough living owing to their previous careful treatment in the hunting stables of England and Ireland. It has however turned out quite to the contrary. Although all classes of horses have been extremely well fed at the front the better bred horses have so far incontestably proved their superiority over the " hairys " and vanners.

This being the case, how are we going to breed up and replenish our stock of hunters and cavalry remounts. Are we going to depend upon Canada and the Argentine or are we going to tackle the question ourselves. Irish farmers are perhaps in a better position to breed this class of horse than we are, owing to their having more and better bred mares in the country, and to the quality of their pasture upon the limestone. But even if this be the case, there is plenty of scope for the English farmer and he ought to be able with the assistance of the landowner and hunting man, to breed first class hunters and chargers. Many people who are interested in the question think it is the duty of the Government to step in and form stud farms in various parts of the country as they do in India, but this I think would be a mistake.

Let us rely, as in the past, upon individual enterprise. For many years there existed at Hampton Court, near London, what was to all intents and purposes a Government stud farm. It was, I believe, formed by William IV., and carried on all through the long reign of Queen Victoria. King Edward abolished it because as a practical man he knew it to be a costly failure. Sires of the highest class stood there, and good mares were purchased from time to time, but I believe I am correct in saying that very few, if any, first class horses were bred there and no Derby winners hailed from Hampton Court.

King Edward bred Persimmon and other winners at Sandringham, but his stud there was, and I am glad to say is, a private enterprise. Steeplechasing giants like Cloister, Manifesto, and Irish Mail were bred at private stud farms and by small men. What applies to racehorses applies equally well to hunters and although all English farmers are not able to breed them a very great number of them could do so with profit if assisted by the Government.

Thanks to the King's Premiums and to the Hunters Improvement Society there are many good blood sires in the country, and much is, of course, done by those gentlemen who keep blood sires for the use of their tenants and neighbours. I lived for some years in South Monmouth, where many first class horses are being bred from thoroughbred stallions kept by Lord Tredegar for his tenants, and for those who hunt with the Tredegar hounds. Colonel Curre of Itton Court, Chepstow, is also a good friend to the farmers in this respect. In Yorkshire, Lord Middleton is one of the several landlords who keep blood sires for the use of tenant farmers.

Mares capable of breeding hunters and cavalry horses are not so frequently met with in England as they were some years back, owing to our having sold so many mares abroad, but if more use were made of what may be termed light cart mares I think farmers might breed some useful horses. In Monmouthshire and on the Welsh borders this is done with good results, more particularly where the mare has a strain of pony blood. Many years ago there were a large number of hunters bred in Shropshire which had their origin from pony blood. To come to more recent days, the celebrated show-ring hack, Chocolate Soldier, the property of Mr. Faudel Phillips, had a pony grand-dam.

Devonshire and Wiltshire mares of the old pack-horse strain breed good short-legged hunters, and these mares are full of pony blood. The action of the Government is bringing back some of the cast cavalry mares from the front, is a step in the right direction, and will, I hope, be continued. It is, I suppose, rather late in the day to question the wisdom of those who endeavour to breed a weight-carrying hunter by crossing a shire mare with a thoroughbred horse, and in Yorkshire especially the reverse is said to be successful; but there is a lot of unsoundness in Shire blood, and many horses bred in this way suffer from feet trouble. A hackney cross is said to improve the jumping powers of hunters, but the hackney is a soft beast at best. Many good hunters are bred from Welsh cob mares.

The subject is one which may be pursued indefinitely, but my experience leads me to believe that the thoroughbred sire is the only one to produce a good hunter or cavalry horse.

Skylark.

THE STILL.

George Pringle was shrewd and prided himself on it, he had come over to Ireland "to take a look at Irish politics and see if things were as serious as people made out," and incidentally to try and "do" a few of "those money-grabbing northerners and thriftless southerners." He had motored through the southern counties in an American car he had hired in Dublin and had seen, as all others who have come to see—nothing.

In the north he had seen everything—guns, drilling, banners—all.

His car had now broken down right in the middle of Donegal, and it would be three days before it could be repaired, so here he was stranded in Tirnanog. [Teernanogue.]

To-day he stood looking up the mountain side at the wonderful field of purple heather, stretching right up to the summit, and splashed at intervals with patches of golden gorse; the whole a scene of barbaric splendour. It suddenly struck his shrewd brain how all this waste could be turned into profitable land by means of his patent weed-killer. Suddenly his train of thought was broken by a low-pitched voice saying in his ear "And is it airing yerself yer are, yer honour?" and he looked round to see a tall dark man in corduroy breeches and a dirty flannel shirt. Annoyed at this intrusion he returned to his designs on the offending heather without reply.

He was once more disturbed by a chuckle of laughter at his side, and on inquiring what was the matter received the following reply:—

"Did yer honour see the old sheep that went past, she was the dead spit of me mother?" Unable to think of any suitable reply, George asked him his name—"Michael Quin," answered the stranger.

"And did yer hear Biddy MacCabe, Patsey Rooney's old woman, had her cow die on her last night ? " "No," gasped George, thinking of all he had heard of cows and pigs sleeping in the cabin. "And was she much hurt ? " "Brave weather we're having of late," volunteered Michael, ignoring his question," and is yer honour one of the English ? " Piqued on seeing he had made some mistake, George Pringle strolled away to return once more to the heather problem, when his attention was again distracted, this time, by a gurgling sound, and he looked round to see Michael Quin lowering the contents of a large black bottle. Michael promptly offered him a drink, and he, wishing to put him at his ease, took one. When he had sufficiently recovered to gasp "Potheen," he noticed first the crafty look on Michael's face, and then a sudden guilty start as though he realised that he was being watched. "Ah, you villain, so you know where there is an illicit still, do you," shouted George ; and poor Michael, though he shook his head violently, turned a guilty red colour. "Dear me," said George to himself, "I was always told the Irish were born actors and could lie to anyone." Prompted by curiosity he began to bluster to Michael, who became more embarrassed as the conversation proceeded until the poor man might have been heard saying "Oh, well, sor, I'll take you to the Still, and what's more, I'll bring you safe back from it again." "My dear man," said George, "You don't mean to say that there would be any danger ; not even the Irish would dare harm anyone in the twentieth century." "I wouldn't put it past them," briefly replied Michael, "but anyway I'll meet you in Tirnanog tomorrow and you'll sleep in Heaven that night ! " "What do you mean by that ? " asked George, now slightly alarmed. Michael smiled softly to himself and replied "Do you not know Tirnanog means Heaven, for that's where the potheen comes from."

Next day just as the red sun was sinking below the mountains of Donegal, Michael Quin strolled up the main (and only) street of Tirnanog to meet Mr. George Pringle, while many curious and rather amused glances were thrown at the pair. After an hour's walking they entered a little crag strewn valley, at the end of which was a tiny tumble-down cottage, and towards this they cautiously made their way. A chill wind blew down the valley and the great dark mountains seemed to almost meet overhead, the whole atmosphere of the place made the man from the cities feel nervous and apprehensive. When quite close to the cottage Michael gave a low weird cry which caused George to turn on him almost savagely and demand "What the h—— do you mean by startling me like that?" "If I hadn't nearly frightened the wits out of yer, yer'd have been a corp this night, and we'd have been wakeing you tomorrow," said Michael calmly. "Look there." There stood a tall gaunt man with what Michael would have called "a murd'rous great gob on him," holding in his hands a rather antiquated make of gun; so Michel's signal being recognised, they entered the cottage in safety.

When his eyes had become accustomed to the gloom George saw a small group of men standing round an uninteresting looking article which he supposed to be the still. Although almost stifled with smoke and the fumes of alcohol, he saw that the still did not appear to be working, so touching a large ruffian near him on the shoulder he drew him to the door to ask him the reason for this, but in doing so the failing light fell full on the man's face, and he recognised him as the Sergeant from the Tirnanog police barracks with the greater part of his face covered with a large false beard! On seeing, by Pringle's expression, that he was discovered the man quickly beckoned him outside the hut and whispered "Don't let on you know me or they'll murder us both. I heard that Michael had planned to get you up here and rob you, so I dressed myself up and at great risk came to save yer, if you don't believe me, crawl back quietly and look in."

Almost already convinced by the manner in which this was said, George Pringle looked into the cottage and heard Michael Quin say to a friend "If he won't pay up we'll have to finish him!"

Now thoroughly frightened, George turned to the sergeant and saying "For God's sake come on and let's get out of this," set off quickly towards the entrance to the valley. "Stop," almost shouted the Bobby, and Pringle was surprised no one heard him. "There are friends of Quin down there, the only way to get out of this alive is to cross the mountains by a secret path, but if I show you this I may leave the force and Ireland, for they'd murder me."

"I'll give you twenty pounds down," gasped poor George, "if you get me safe back to Tirnanog. "Right," returned the sergeant, "but mind you must pay Michael his money and not put the law on him, for I'd not like to see Tirnanog in the papers, and all through me saving your life."

And to this day George Pringle has never had an answer to the unasked question as to why the still was not working that night. But if you go into the heart of Donegal to a little village, still surrounded by heather, and ask a certain Michael Quin, he would tell you. How a certain shrewd Englishman was completely taken in by a little native acting and how an old still which had been confiscated years before, after the owners had done with it, had been taken at daybreak to an old cottage in a beautiful boulder strewn valley, and there deposited by the police force of Tirnanog to await the coming of Michael and a certain George Pringle. The police were dressed in ordinary clothes with a few bad make-ups so that the first to come to the light would be sure to be recognised by the Englishman. Michael may also explain that the first inklings of the plot came to him when George had shouted "Potheen," after drinking his ordinary strong whiskey. You may see this same old still in Tirnanog combined barracks and post office any day you happen to get there.

T. C. D.

DIPLOMA EXAMINATION.

At the end of last term (Christmas) Mr. Ahmad Samy, Cairo, Egypt, on re-examination passed in Agricultural Chemistry and obtained the Honour Diploma of Membership (M.R.A.C.).

SCHOLARSHIP AND HONOURABLE MENTION.

From the results of the examinations of last term (Christmas, 1914), Mr. A. S. Patten obtained the Second Scholarship, and Messrs. Buckle, Sarris, and I. Douglas received Honourable Mention for the Term's Work.

METEOROLOGICAL OBSERVATIONS, 1914.

The total rainfall for the year, recorded at the College Station, was 32·91 inches, measured on 182 days, being 2·18 inches above the average for the year. The months of March, November, and December were characterised by a rainfall of over four inches. In December the rainfall at the College Station was 6·43 inches, which is the highest December value recorded since 1876, when 7·38 inches was recorded. The greatest daily fall was (1 inch) on November 2nd ; other heavy falls were measured on June 9th (·94 inches), and December 28th (·91 inches). No rain fell from April 13th to May 2nd, and from September 18th to October 12th only ·01 inch, measured on September 27th, was recorded.

Rainfall measured at the R. A. College Meteorological Station, together with the monthly deficiency or excess (in inches).

1914.	1914 Rainfall.	Average for Month.	Difference from Average.
January	·72	2·52	− 1·8
February	3·7	2·27	+ 1·43
March	4·03	2·01	+ 2·02
April	1·24	1·97	− ·73
May	1·51	2·08	− ·57
June	2·33	2·39	− ·06
July	3·59	2·85	+ ·74
August...	1·11	3·15	− 2·04
September	1·63	2·69	− 1·06
October	2·11	3·15	− 1·04
November	4·51	2·97	+ 1·54
December	6·43	2·68	+ 3·75
For the whole year ...	32·91	30·73	+ 2·18

The mean temperature for the year was 2·4°F. above the average. The monthly mean temperature was below the average only in January, the deficiency for this month being 0·1°F. The highest temperature registered at the College Station was 85°F. on July 1st. A temperature of 83·3°F. was recorded on June 30th. The lowest temperature of the year was 18·5°F., measured on the first day of the year.

MONTHLY MEAN TEMPERATURES AND AVERAGE MEAN FOR MONTHS, 1914, compiled from R. A. College Station records (in degrees F.)

1914.	Monthly Mean Temp.	Average Mean.	Difference from Average.
January	37·2	37·3	− ·1
February	42·2	38·4	+ 3·8
March	42·9	40·9	+ 2·0
April	50·4	45·5	+ 4·9
May	53·2	50·7	+ 2·5
June	59·9	57·0	+ 2·9
July	60·7	60·3	+ ·4
August	61·3	59·0	+ 2·3
September	56·1	55·1	+ 1·0
October	51·0	47·6	+ 3·4
November	44·7	41·9	+ 2·8
December	40·2	37·6	+ 2·6
For the whole year ...	50·0	47·6	+ 2·4

The duration of bright sunshine at the College Station was higher than the average. The total number of hours was 1,538, compared with an average of 1,508. In April there was an excess of 88 hours over the average, while May gave 34 hours below the average.

TABLE OF BRIGHT SUNSHINE FOR MONTHS IN 1914, compiled from the R. A. College records.

1914.	Hours.			Percentage.		
	No. of hours.	Average for month.	Difference from average.	Percentages of possible duration.	Average percentage.	Difference from average percentage.
January ..	39	47	− 8	16	19	− 3
February ...	62	72	− 10	23	26	− 3
March ...	87	116	− 29	24	32	− 8
April ...	245	157	+ 88	59	38	+ 21
May ...	170	204	− 34	36	42	− 6
June ...	217	195	+ 22	44	40	+ 4
July ...	153	199	− 46	31	40	− 9
August ..	179	182	− 3	40	41	− 1
September ...	197	139	+ 58	53	37	+ 16
October ...	86	101	− 15	27	31	− 4
November ..	55	57	− 2	21	22	− 1
December ...	46	39	+ 7	19	16	+ 3
For the whole year..	1536	1508	+ 28	33	34	− 1

METEOROLOGICAL OBSERVATIONS AT THE R.A.C., 1914.

Week ending	Temperature.				Rainfall.			Earth Temperature.			Bright Sunshine.						No. of nights frost on grass.	Lowest temperature on grass. F°
	F°. Max.	F°. Min.	F°. Mean	Monthly mean, 1914, and average monthly mean (in italics)	Inches.	No. of days.	Monthly Rainfall, and average ditto (in italics)	1 ft.	4 ft.	Monthly Mean.	Daily mean.	Average.	Percentage	Average percentage	Monthly mean, and averages (in italics).	Percentage possible and average percentage (in italics).		
Jan. 10	46·8			37·2	·36	4	·72	40·2	44·0	39·0 (1 ft.)	1·6	1·5	21	19	1·28	16	—	—
17	39·5	31·9	35·9		·04	1		39·5	43·9		1·4	1·5	18	19			2	26
24	36·3	26·0	31·4		—	—		37·6	43·2		1·4	1·5	17	18			7	19
31	48·6	35·2	42·2	*[37·3]*	·30	5	*[2·52]*	39·0	42·7	42·6 (4 ft.)	·5	1·7	6	21	*[1·52]*	*[19]*	3	27
Feb. 7	51·3	38·6	45·0	42·2	·85	2	3·7	42·8	43·4	42·6 (1 ft.)	2·8	1·9	32	22	2·21	23	—	31
14	51·1	36·9	44·0		1·32	7		43·4	44·1		2·2	2·2	24	23			—	31
21	47·6	33·7	40·7		1·24	6		42·9	44·7		1·0	2·5	10	26			3	27
28	46·3	31·7	39·0	*[38·4]*	·29	5	*[2·27]*	41·5	44·1	44·1 (4 ft.)	2·8	2·8	28	28	*[2·57]*	*[26]*	3	27
Mar. 7	50·3	37·7	43·8	42·9	·44	4	4·03	42·7	44·0	42·7 (1 ft.)	2·7	3·1	26	29	2·82	24	—	31
14	49·0	35·1	41·8		1·95	6		43·3	44·5		3·2	3·4	29	30			2	26
21	45·9	35·1	40·3		·65	6		42·7	44·4		3·5	3·6	30	32			3	29
28	48·4	34·2	41·1	*[40·9]*	·61	6	*[2·01]*	41·5	44·0	44·2 (4 ft.)	2 3	3·9	19	33	*[3·74]*	*[32]*	4	28
Apr. 4	56·3	44·6	50·2	50·4	·96	5	1·24	45·0	44·5	47·8 (1 ft.)	3·8	4·3	31	35	8·17	59	—	36
11	54·2	41·3	47·4		·65	6		45·5	45·7		5·1	4·6	40	36			2	23
18	56·8	38·6	47·3		·01	1		46·8	46·1		10·8	5·0	81	37			3	28
25	65·4	43·0	53·7	*[45·5]*	—	—	*[1·97]*	49·9	46·9	46·4 (4 ft.)	9·3	5·3	67	38	*[5·23]*	*[38]*	—	34
May 2	60·8	41·2	50·5	53·2	—	—	1·51	50·9	48·7	52·3 (1 ft.)	8·4	5·7	59	39	5·65	36	1	26
9	57·3	47·3	52·0		1·08	7		50·5	49·3		3·4	6·0	23	40			—	35
16	59·9	44·2	51·6		·19	2		49·8	49·2		5·2	6·3	34	42			1	30
23	69·9	49·0	58·8		·20	2		55·4	50·6		10·1	6·5	66	42			—	39
30	57·7	43·4	50·1	*[50·7]*	·04	2	*[2·08]*	54·1	52·1	50·3 (4 ft.)	4·2	6·7	26	42	*[6·58]*	*[42]*	3	26

June 6	63·9	50·6	56·8	59·9	—	—	2·33	55·8	52·4	58·2 (1 ft.)	4·6	6·8	29	42	7·23	44	—	36
13	62·9	50·3	56·2		2·18	4		56·0	53·5		6·0	6·7	37	41			—	38
20	72·4	52·0	61·5		·13	2		59·2	54·5		7·8	6·6	48	41			—	44
27	69·8	50·3	59·4	*[57·0]*	·02	1	*[2·39]*	59·2	55·6	54·2 (4 ft.)	8·0	6·5	49	40	*[6·50]*	*[40]*	—	38
July 4	74·7	53·1	63·2	60·7	·70	4	3·59	62·7	56·6	61·3 (1 ft.)	8·4	6·4	51	39	4·94	31	—	38
11	70·4	52·5	60·8		·71	3		61·2	57·8		6·7	6·4	41	40			—	42
18	70·6	54·1	61·8		·58	5		62·5	58·2		5·0	6·4	31	40			—	47
25	66·5	54·4	60·0	*[60·3]*	1·01	3	*[2·85]*	61·4	58·6	58·0 (4 ft.)	3·0	6·4	19	40	*[6·42]*	*[40]*	—	45
Aug. 1	65·5	50·1	57·3	61·3	·84	3	1·11	58·8	57·9	60·6 (1 ft.)	3·8	6·4	24	41	5·77	40	—	42
8	65·6	50·4	57·5		·58	7		59·5	57·9		3·2	6·3	21	41			—	41
15	73·1	54·2	63·1		·15	2		60·8	57·8		7·6	6·1	51	41			—	41
22	70·2	51·4	60·2		·03	2		60·7	58·3		6·5	5·9	45	40			—	43
29	71·0	52.6	61·3	*[59·0]*	·32	2	*[3·15]*	61·2	58·8	58·3 (4 ft.)	7·0	5·7	50	40	*[5·87]*	*[41]*	—	41
Sept. 5	74·0	53·8	63·4	56·1	—	—	1·63	62·0	59·6	57·5 (1 ft.)	7·1	5·4	52	39	6·57	53	—	43
12	69·6	52·3	60·5		·63	4		61·0	59·1		5·3	5·1	41	39			—	36
19	61·5	48·6	54·7		·99	5		57·1	58·3		5·2	4·8	41	38			—	39
26	61·6	38·4	49·4	*[55·1]*	—	—	*[2·69]*	53·5	56·6	57·9 (4 ft.)	7·8	4·5	63	36	*[4·63]*	*[37]*	1	30
Oct. 3	61·6	42·2	51·4	51·0	·01	1	2·11	53·3	55·4	51·9 (1 ft.)	5·8	4·2	49	36	2·77	27	2	28
10	60·3	44·7	52·3		—	—		53·2	54·9		3·5	3·9	31	34			—	33
17	55·9	46·6	51·2		·61	3		52·2	54·3		1·2	3·5	11	32			—	33
24	55·0	46·5	50·6		·67	4		51·2	53·6		2·4	3·2	23	31			—	35
31	53·0	43·8	48·3	*[47·6]*	·83	6	*[3·15]*	50·3	53·1	54·1 (4 ft.)	3·4	2·9	34	29	*[3·26]*	*[31]*	—	31
Nov. 7	52·4	45·9	49·2	44·7	1·83	7	4·51	49·4	52·1	45·8 (1 ft.)	1·8	2·6	19	27	1·83	21	—	32
14	52·3	42·9	47·6		·71	4		48·6	51·4		1·8	2·3	20	25			—	33
21	42·3	34·7	38·5		·22	2		43·9	50·0		3·2	2·0	37	23			5	24
28	45·5	37·5	41·5	*[41·9]*	·57	5	*[2·97]*	41·7	47·4	50·0 (4 ft.)	·9	1·8	11	21	*[1·90]*	*[22]*	3	23
Dec. 5	50·9	44·8	48·0	40·2	2·08	6	6·43	44·8	47·0	41·7 (1 ft.)	1·3	1·6	16	20	1·48	19	—	33
12	46·2	39·5	43·0		1·18	5		42·5	46·7		1·0	1·4	13	18			2	27
19	—	—	—		1·48	5		42·3	45·9		1·3	1·3	17	17			1	29
26	39·5?	27·4?	33·7?		1·02	5		39·5	45·0		1·9	1·2	25	16			7	23
Jan. 2	42·8?	30·8?	37·0?	*[37·6]*	2·73	6	*[2·68]*	39·3	43·4	45·7 (4 ft.)	1·6	1·3	21	18	*[1·26]*	*[16]*	3	20

Mean Temperatures, Rainfall, and Bright Sunshine for the Whole Year, 1914, together with averages (R. A. College Station records).

	Mean Temperature. ° F.	Mean Earth Temperature. ° F.		Rainfall for the year (in inches).	Bright Sunshine.	
		1 ft.	4 ft.		Total in hours.	Percentage of possible.
1914 ..	50	50·1	50·5	32·91	1536	33
Average ..	47·6	—	—	30·73	1508	34

H. D. E.

POULTRY NOTES.

An Intensive House was added to our Poultry plant in November, 1913. The house measures 32ft. long, 10ft. wide, 7ft. high in front and 5ft. 9in. high at back. It is divided into four sections, each section capable of accommodating twenty birds, allowing four square feet of floor space for each bird.

Twenty pullets of each of the following varieties were purchased and placed in the house in December, 1913.

Section 1.—Rhode Island Reds.
Section 2.—Buff Orpingtons.
Section 3.—White Wyandottes.
Section 4.—White Leghorns.

Careful records have been kept from January 1st, 1914, from which date the birds have been kept absolutely on the Intensive system. No male birds were kept in the house.

The following interesting observations have been made :—

1.—The eggs laid by these birds have very pale yolks, much paler than those laid by hens in the open runs. This could not be caused by lack of green food, as the birds had a plentiful supply of fresh green food always before them.

2.—One section (White Wyandottes) developed a propensity for egg-eating, which has seriously affected the egg average for this section.

3.—A certain number of birds in each section developed scaly-leg, which became very bad as the season advanced, even though they were constantly treated.

4.—The heavier varieties developed the habit of feather-eating. This may be partly due to the very hot and dry summer, especially as the house had very little shade from the sun, and this no doubt had a very marked effect on the egg record, as quite a number of the birds moulted twice during the year.

The birds were fed on small seeds and cracked corn scattered amongst the litter (straw and cavings) during the day, and received a wet mash in the evening. Green food, grit, oyster shell, and fresh water was supplied daily.

Six birds died during the year, one each in sections 1 and 4 and two each in sections 2 and 3.

The following table shows the monthly yield of eggs in each section, and judging from the total yield, even of the best section, it cannot be said that the system proved a commercial success.

The total cost of the house was £27 10s. 0d., and this works out at a capital expense of 6s. 10½d. per head for the first year.

Month.	Rhode Island Reds. SECTION 1.	Buff Orpingtons. SECTION 2.	White Wyandottes. SECTION 3.	White Leghorns. SECTION 4.
January ...	185	169	107	97
February ...	154	138	85	154
March	230	158	173	214
April	207	194	223	223
May	195	224	179	182
June	161	90	75	118
July	119	124	68	177
August ...	136	128	57	76
September ...	115	101	62	126
October ...	75	68	11	17
November ...	11	0	3	15
December ...	83	90	120	20
Totals	1671	1484	1163	1419
Average per head	83·5	74·2	58·15	70·95

OBITUARY.

The Right Honourable Baron Estcourt, George Thomas John Sotheron-Estcourt, 1st Baron, died on January 12th at his residence, Estcourt, Tetbury; aged 75. The late Lord Estcourt succeeded to the Estcourt estates in 1894 on the death of his father, but he had resided there from 1876, since the death of his uncle. He took an active interest in the affairs of his neighbourhood both in Wiltshire and Gloucestershire, as a good landlord and as a sportsman he was noted. There were few forms of sport which he had not followed, and he excelled in many. He was a Governor of the Royal Agricultural College under its old *regime* and took a great deal of interest in its work.

We regret to record the death of Arthur Ernest Brooke-Hunt, M.R.A.C., 1879, which occurred at 6, Augusta Gardens, Folkestone, on January 2nd, after a protracted illness. Mr. Brooke-Hunt was born June 16th, 1854, he was buried at Upton St. Leonards, Gloucestershire, on January 6th. He was B.A. of Trinity College, Cambridge, and became M.R.A.S.E. by Examination and also F.H.A.S. by examination: for many years he was H.M. Inspector of Agricultural Education to the Board of Agriculture (for England and Wales), and in that capacity visited his old College the R.A.C., in which he was always greatly interested. He took a great interest in the Agricultural Education Association, of which he was for many years chairman. Aged 60.

We deeply regret to record the death of Mrs. Russell Swanwick at the Royal Agricultural College Farm on Thursday, February 4th, following an attack of pleurisy. During the whole of her married life, about forty-five years, she has resided at the College Farm, and during this time invariably shown great kindness and hospitality to succeeding generations of the College Staff and Students by whom her loss is deeply regretted.

We are sorry to notice the death of Henry William Lloyd Tanner, M.A., D.Sc. (Oxon), A.R.S.M., F.R.A.S., F.R.S., who was Professor of Mathematics and Physics at the R.A.C. 1875 to 1879. Professor

Tanner was for some years Professor of Mathematics and Astronomy in the University College of South Wales and Monmouthshire at Cardiff. He died on March 6th, 1915, at Exeter, aged 64. His father was the first Diploma holder (M.R.A.C.) of this College.

OLD STUDENTS AND STAFF.

The President of the Board of Agriculture and Fisheries has appointed Mr. E. J. Cheney, M.R.A.C., to the office of Chief Agricultural Adviser to the Board.

Sergeant-Instructor W. Day, of the Worcester Regiment, formerly attached to the R.A.C. Officers' Training Corps, has been granted a Commission as Second-Lieutenant, and attached to the Leicestershire Regiment.

FARM NOTES.

COLLEGE HOLDING.

The price of beef being high, three cows have been drafted this term from the dairy herd and fatted for the butcher. Two down calving heifers and a young cow, recently calved, have been purchased to take the places of those sold off. The two heifers have calved since their arrival, and are milking satisfactorily.

The small flock of Kerry Hill ewes, which were crossed last autumn with a Southdown ram, commenced lambing early in March, and up to the present the results have been very encouraging. A good percentage of twins is in evidence, and the lambs are doing well, being well supplied with milk by their mothers.

The weather has now improved after the excessive rainfall during the early part of the year, and farmers in the neighbourhood are busy preparing their tilths for spring corn, a certain amount of which has already been sown.

Winter wheat generally is looking very well, and the winter oats in the Experiment Field (No. 11) are beginning to make a strong growth. Four acres of Manitoba wheat (Red Fife) were also drilled in this field on March 16th, the seed bed at the time of sowing being all that could be desired.

During the coming season manurial trials on various crops and tests with varieties of potatoes will be carried out, as last year.

A point of interest in these trials will be the use of Phonolite as a substitute for some of the better known Potash salts, which are now difficult to obtain owing to the present state of war existing in Europe.

R.A.C. BEAGLES.

In spite of various difficulties the Beagles have been hunting during the term. Thanks to the kindness of several ladies and gentlemen in the neighbourhood, the hounds were billeted out from October to January. At the beginning of the term the pack returned to the Kennels, very fit but in some cases rather fat owing to good living. Six meets were held as follows :—

Wednesday, Feb. 3.—Mr. A. E. Hill's, Poulton.
Saturday, Feb. 6.—Mr. J. Adamthwaite's, Siddington.
Wednesday, Feb. 10.—Mr. S. Dennis's, Latton.
Wednesday, Feb. 24.—The Kennels.
Wednesday, March 3.—Mr. R. H. Cole's, Ashbrook.
Wednesday, March 10.—Mr. J. A. Attwater's, Dry Leaze.

As very few hares had been shot in the district during the year, they were very numerous, and several good runs were spoilt by a fresh hare getting up in front of hounds when the hunted hare was becoming tired. This fact, together with the large number of unentered puppies in the pack, and last, but not least, the lack of speed and wind of the Acting Master and Whips, may perhaps account for the small number [0. Ed.] of hares killed.

Thanks are due to the gentlemen at whose houses we met, and over whose land we hunted, and to Messrs. T. C. Dickie and R. Moses for their services as whips.

C. B. Saunders, Acting Master.

LAWN TENNIS.

The Meysey-Thompson Hard Court Lawn Tennis Challenge Cup.—The annual competition for the cup was played on March 22nd.

Calderon and Degiardé won the final, easily beating Jackman and Lambhate by two straight sets. Other competitors were Dickie and Mires, and Moses and Douglas.

GOLF.

The Senior and Junior Cups were played for on Saturday, March 27th.

The Senior Cup was won by C. B. Saunders with 89—5=84.

The Junior Cup was won by J. A. Degiardé with 129—22=107.

There were very few entries.

REVIEWS.

"FIGHT TILL THE FIGHT IS WON." A Soldier's Marching Song. Words by P. T. Trentham Maw, music by Louis Delune.

"CLEAR THE DECKS FOR ACTION." A Song for the British Navy. By the same authors. A. Wood and Sons, Station Road, Redhill. 1s. nett each.

Among the many activities of past students and staff of the R.A.C. in connection with the war is the production of a Marching Song by Mr. P. T. Maw, a former Student and Professor of Forestry, and more recently of a Song for the Navy. We hope they may help to lighten the routine work of many of our men at the front, and of our gallant seamen.

PASTURE PROBLEMS: THE RESPONSE OF INDIVIDUAL SPECIES UNDER MANURES. By R. G. Stapledon. From the Journal of Agricultural Science, Vol. VI., Pt. 4. December, 1914.

In this paper Mr. Stapledon gives the result of some of his experiences and observations on certain types of grass-land, viz., (1) on Calcareous soils over the Great Oolite at an altitude of about 400 feet, such as the Chapel Close, R.A.C., Cirencester; (2) on Residual Clay over the Oolite, about 400 feet altitude, as at Tarlton and at Dry Leaze, Cirencester; (3) Second-class pastures on Ordovician Shales, about 400 feet altitude, at Aberystwyth; and (4) Heath and Fescue-Agrostis Pastures, Welsh Sheep Walks, 600—900 feet altitude, at

Glandyfi, Aberystwyth. Partial botanical analyses of such types of pasture are given and of the herbage resulting from their treatment with superphosphate, superphosphate and kainite, and the same with addition of nitrogenous manures. On the first type of soil *Bromus erectus* is the predominant grass ; on the second, *Lolium perenne* and *Dactylis glomerata* ; on the third, *Dactylis glomerata*, *Cynosurus cristatus*, and *Agrostis vulgaris* are the main grasses with a good amount of *Trifolium repens* ; on the fourth type *Festuca ovina* and *Agrostis vulgaris* and *A. alba* predominate. How these were influenced by the respective manurings is set out in Mr. Stapledon's paper, as also general conclusions from his analyses and observations, and a consideration of the various factors which are operative in bringing about alterations in the composition of the herbage. A most useful contribution to our knowledge concerning Pasture Problems, the study of which we are glad to know is still occupying the author's energies in the neighbourhood of Aberystwyth.

PRODUCTIVE VEGETABLE GROWING. By J. W. Lloyd, M.S.A. Philadelphia and London. J. B. Lippincott Co. pp. vi. and 339. 6s. net.

This is one of Lippincott's Farm Manuals, of which six volumes have already been published, and surely it is one of the most useful. It contains nearly 200 illustrations and a good index. The author is we learn the Professor of Olericulture in the University of Illinois, and is evidently well up in vegetable gardening both from practical and theoretical points of view, and he imparts his knowledge in a clear and logical manner. The book is written mainly with regard to the conditions which exist in the great central prairie region of the United States, known agriculturally as the corn belt. But the author explains the main principles of successful vegetable production so that the gardening operations may be modified and adapted to other regions and other surroundings. A great point is made of an understanding of the temperature and requirements of the different crops and this is largely made use of in the classification of vegetables and the cultural directions for the various crops. The book is primarily intended as a text book for use in schools and colleges, and at the end of each chapter is given a series of questions useful for this purpose. We venture however to say that no kitchen gardener or practiser of olericulture, whether simply producing vegetables for himself or producing them on a large commercial scale, can fail to learn something of value to himself from this work. One good feature of the book is the description and illustration of various implements and pieces of apparatus used in the kitchen garden, not the least important and useful of these is the Wheel Hoe, of which there are two main varieties, the single wheel hoe and the double wheel hoe.

Agricultural Students' Gazette.

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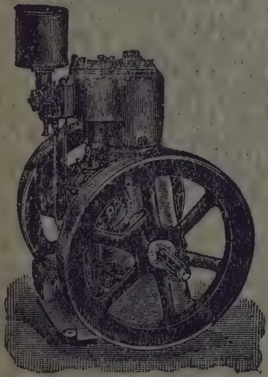

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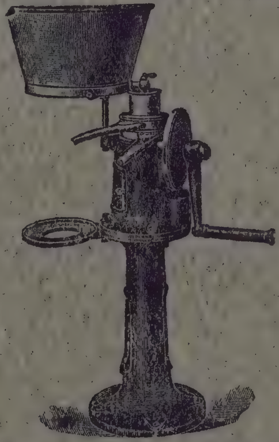

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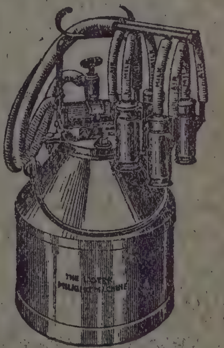

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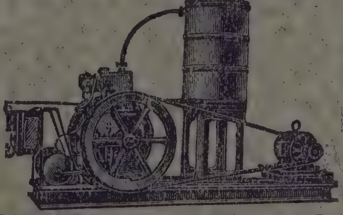

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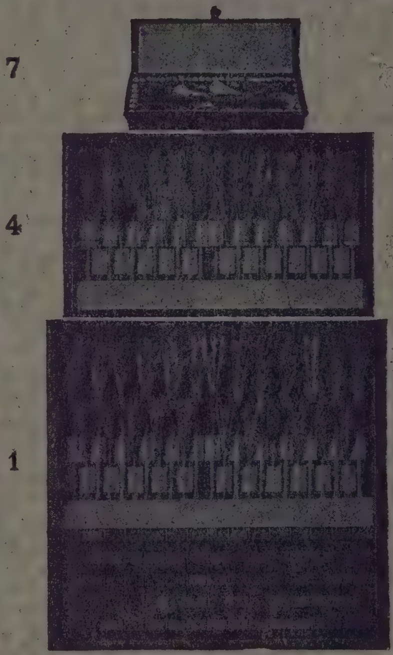

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NEW SERIES.
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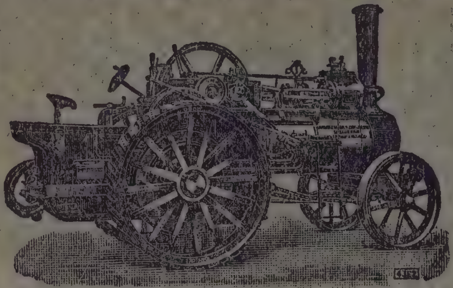

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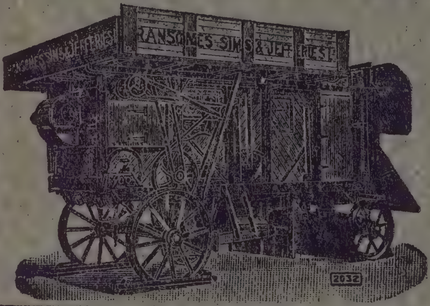

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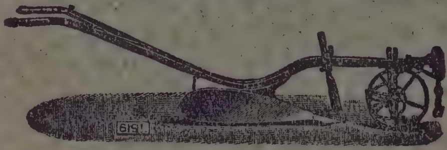

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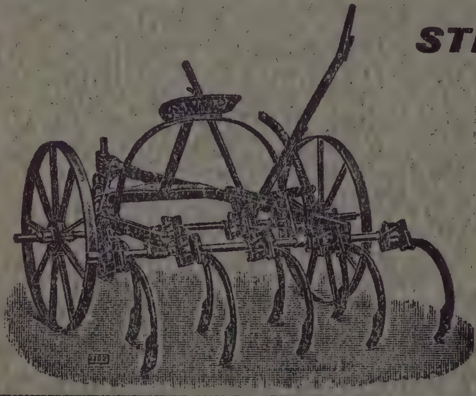

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GILL FUND.

The closing of the College for the period of the War is inflicting great hardship on Members of Staff, as there are no available funds for providing pensions or any other form of financial compensation. The most deplorable case is that of the College Matron, Mrs. Gill, upon whom an invalid son is entirely dependent, and who is no longer young enough to have much chance of securing other employment. A fund (the Gill Fund) has therefore been started to provide Mrs. Gill with a retiring allowance, and enough has already been collected (in sums varying from £1 to £20) to meet her needs for one year. For the last 33 years she has served the College with devotion, and former In-students who have benefited by that service during the period mentioned are urged to make generous contributions, which should be sent to the Hon. Treasurer, Captain J. R. Ainsworth-Davis, c/o Lloyd's Bank, Cirencester. This appeal, however, is addressed to all alumni and friends of the College, not to former In-students only.

Mr. Geo. A. Wills, of Bristol, generously promises £25 if the sum of £500 is raised by the end of September.

THE EDITORS.

NEW SERIES.
Vol. XVII. Part 4. JULY, 1915.

AGRICULTURAL STUDENTS' GAZETTE.

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The Red Cross in the Great War.

British Red Cross Society

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FOR the task of succouring the sick and wounded in the great war the two recognised Red Cross Societies in this country—the St. John Ambulance Association and the British Red Cross Society—have joined forces. Their primary object is to supplement the work of the Royal Army Medical Corps in the field, and to render such medical aid as may be possible to our gallant Allies.

THIS IS A GREAT AND NOBLE TASK. If we desire to show an affectionate concern for those stricken in our defence, no more practical method exists than to give financial help or personal service to the work of the Red Cross.

The St. John and the Red Cross have already sent out to the Continent a personnel of upwards of 3,500, comprising doctors, trained nurses, orderlies, and chauffeurs. Three ambulance trains have been provided and over 900 motor ambulances have been sent for the quick transport of the wounded from the fighting line, which very often means life when death would otherwise be certain. Stores of every description and over a million garments for the wounded have been despatched to the theatre of war. The Red Cross Societies have established large hospitals in Calais and elsewhere in France. In this country they have a hospital at Netley, and have completely equipped the King George Hospital in London, and in addition, have provided over 27,000 beds—all accepted by the War Office.

EVERY DAY SEES AN INCREASE in the work of the Red Cross and in the cost of its maintenance. The money subscribed is carefully administered, the arduous task of organisation is performed by men and women of eminence, who accept no pay for what they consider a labour of love. The Red Cross doctors, nurses, and orderlies win the affectionate gratitude of those to whom they minister by their skill, devotion, and bravery.

WILL YOU NOT HELP IN THIS GREAT WORK by contributing something, however little, to the funds of the Red Cross? The least which those of us who are compelled to stay at home can do is to help the Red Cross to succour in their hour of need the brave and patriotic men heroically hazarding their lives in defence of our freedom and our very existence.

All Contributions should be sent to the Headquarters Collections Committee, Room 99, 83 Pall Mall, and Cheques be made payable to the Joint War Committee.

Photo by W. Dennis Moss

Yrs truly
E B Haygarth

NEW SERIES.

Agricultural Students' Gazette.

Vol. XVII. JULY, 1915. No. 4.

ROLL OF HONOUR.

PAST AND PRESENT STUDENTS AND MEMBERS OF THE STAFF OF THE R.A.C. WITH H.M. FORCES, 1914-15.

Corrections and additions will be welcomed by the Editor.

S.—Service Battalions. *T.*—Territorial Forces. R.—Special Reserve.
O.T.C.—Officers' Training Corps, R.A.C.

Alderson-Archer, S. F., Capt., Reserve of Officers (R.G.A.). General Staff Officer, Second Grade.

(*T.*) Aldworth, J. N., Capt., 4th Batt. Berkshire Regt.

(*T.*) Anderson, R. G., 2nd Lieut., Royal Gloucestershire Hussars Yeomanry.

(*T.*) Anderton, A. C., Capt., R.E., Cornwall Electric Light Coy.

(*T.*) Archer, P. A. E., Lieut., 1st Devon Yeomanry.

(*S.*) Arden, A. C., 2nd Lieut., Army Service Corps.

Arnold-Forster, J. A., M.R.A.C. (*O.T.C.*), 2nd Lieut., A.S.C.

(*T.*) Ashton, S. E., Capt., Cheshire Yeomanry.

(*T.*) Ashton, T. W., Lieut., 4th Batt. Duke of Cornwall's Light Infantry.

Badger-Clark, G., L.-Cpl. H. Q. Signal Squadron, 2nd Mounted Egyptian Division.

Bailey, Hon. G. Sergisson, 2nd Lieut., Grenadier Guards.

(*T.*) Baird, W. A., Major, Lothians and Border Horse.

Bamford, C. A., Lieut., 3rd Batt. Leicestershire Regt. (Attached 1st Batt.)

(*T.*) Barbour, R., Major, Cheshire Yeomanry. (Hon. Lieut. in Army.)

Barclay, Guy, Lieut., Royal Navy.

(*T.*) Baring, A. F. C., Lieut., 7th (Cyclist) Batt. Devonshire Regt.

(*T.*) Barker, E. C., M.R.A.C., 2nd Lieut., 4th Batt. Shropshire Light Infantry.

(*T.*) Barneby, W. T., 2nd Lieut., Shropshire Yeomanry.

Bathurst, The Right Hon. the Earl, C.M.G., Colonel, Gloucestershire Regiment, Draft Conducting Officer, attached to 3rd Batt. (Hereditary Governor R.A.C.)

(*T.*) Bathurst, Hon. B., M.R.A.C., Lieut.-Col., O.C., 5th Batt. (Reserve) Gloucestershire Regiment.

(*R.*) Bathurst, C., M.R.A.C., Capt., Royal Monmouthshire R.E., Assistant Military Secretary, Personal Staff. (Governor of R.A.C.)

(*T.*) Beardsley, H. H., M.R.A.C., Inns of Court O.T.C.

(*S.*) Bell, H. C., M.R.A.C., 2nd Lieut., 7th Batt. Royal Dublin Fusiliers.

Bell, H. P., Lieut.-Col., 8th Batt. Leicester Regiment.

(*T.*) Bell, J. C., Lieut., M.R.A.C., 7th Batt. Royal Scots.

(*T.*) Bennett, C. J., M.R.A.C., 2nd Lieut., Derbyshire Yeomanry.

(*T.*) Benson, F. R., Lieut., Shropshire Yeomanry. (Hon. Lieut. in Army.)

(*T.*) Birchenough, R. P., 2nd Lieut., Derbyshire Yeomanry.

(*S.*) Blaauw, H. T., M.R.A.C., Lieut., 2nd Sportsmen's Batt. (24th Royal Fusiliers).

(*T.*) Blackett, Sir H. D., Bart., Capt., Northumberland Yeomanry.

(*S.*) Blaker, H. H., Staff Capt., 66th Infantry Brigade, 3rd New Army. (Late Capt. 4th Border Regt.)

Bonnin, H. A. V., Lieut., Army Ordnance Dept.

Brand, Hon. R., Capt., 5th Batt. Rifle Brigade.

(*S.*) Bretherton, W. (*O.T.C.*), Sportsmen's Battalion (Royal Fusiliers).

(*R.*) Brewster, K. W., (*O.T.C.*) 2nd Lieut., 6th Batt. Royal Fusiliers.

Bridel, P. A., Trooper, 1st Regiment, 5th S. African Mounted Brigade.

(*T.*) Brigg, J. H., 2nd Lieut., Bedfordshire Yeomanry.

Britten, R. S., Capt.

(*T.*) Brocklehurst, W., Capt., A.S.C.

(*T.*) Burdon, H. L. C., 2nd Lieut., A.S.C.

(*T.*) Burke, J. M. (*O.T.C.*), Royal Engineers.

Burne, L. G. L., Capt., Indian Army.

(*T.*) Burrell, S., Major, Northumberland Yeomanry.

(*T.*) Busk, J., 2nd Lieut., Dorsetshire Yeomanry.

(*S.*) Butt, G. W. T., 2nd Lieut., 8th Batt. Shropshire Light Infantry.

Byng, A. S., Major, A.S.C.

(*T.*) Calvert, H. M., Lieut., Royal Gloucestershire Hussars Yeomanry.

(*T.*) Campbell, W. F., Capt., 4th Batt. Sussex Regt.

(*T.*) Campbell-Orde, Sir A. J., Bart., Major, 1st Lovat's Scouts (Late Lieut., Imperial Yeomanry.)

Carlyon, G., Major, 7th Batt. S. Lancs. Regiment.

(*T.*) Carr, R. C. W., 2nd Lieut., 1st Lovat's Scouts. (Hon. Lieut. in Army.) (Late Lieut. Imperial Yeomanry.)

(*R.*) Charlton, St. J. A., Lieut., 4th Batt. Bedfordshire Regt. Killed in action.

Christie, William Charles, Major, Royal Warwickshire Regt., Adjutant R.A.C. O.T.C. Killed in action. Twice mentioned in despatches.

Clapham, T. B., Lieut., Van Deventer's Horse.

Clive, P. A., M.P., Capt., Reserve of Officers, Grenadier Guards. Legion d' Honneur.

(*R.*) Clyne, C., Capt., Royal Warwickshire Regt.

Cochrane, W. O'G., Lieut., Royal Navy.

(*T.*) Coles, R. H., M.R.A.C., 2nd Lieut., W. Somerset Yeomanry.

Collas, F. J., Lieut., R.F.A. (Lieut., Royal Jersey Artillery.)

Collins, M. E. T., British Columbian Mounted Rifles.

(*T.*) Comely, C., M.R.A.C. (*O.T.C.*), Lieut., 2nd Batt. Monmouthshire Regiment. Reported wounded April 3rd.

(*T.*) Comely, R. B., M.R.A.C. (*O.T.C.*), 2nd Lieut., 2nd Batt. Monmouthshire Regiment. Wounded January and again April. Mentioned in despatches May 31st. Awarded Military Cross June 3rd. Military Medal.

(*S.*) Cooke, C. A., Capt., 8th Batt. the Queen's Regt. (Late Lieut. W. Yorkshire Regt.)

Cooper, C. F. A., Lieut., A.S.C.

Cope, Denzil, Capt., 3rd Batt. Hants Regt. (Attached 1st Batt.)

(*T.*) Cox, D. H., 2nd Lieut., Scottish Horse.

Crackanthorpe, O. M., Lieut., (Attached Royal Scots Regt.) (Hon. Lieut. in Army.)

(*T.*) Cranstoun, G. H. H. E., Capt., Lanarkshire Yeomanry.

(*R.*) Craven, T. L., M.R.A.C., Lieut., 3rd Batt. Highland Light Infantry. (Attached as Capt. to 10th Batt.)

(*R.*) Crawshay, O. T. R., Capt., W. Riding Regt.

(*T.*) Creyke, E. R., Lieut., 5th Batt. King's Own Yorkshire L.I.

Cripps, F. W. B., Capt., Gloucestershire Hussars Yeomanry, Brigade Major 2/1 South Midland Mounted Brigade. (Governor R.A.C.)

(*S.*) Cronan, E. J. H., M.R.A.C. (*O.T.C.*), 2nd Lieut., 11th Batt. Royal Fusiliers.

Davy, R. M. M., Capt., Reserve of Officers, Gloucestershire Regt. Adjutant No. 1 Infantry Base Depôt.

(*S.*) de Halpert, R. V. (Lieut. R.N.), Flight Lieut., Royal Flying Corps.

de Trafford, G. E. (*O.T.C.*), Rand Rifles (Mounted Section) of the Northern Force.

(*R.*) de Trafford, R. F., M.R.A.C. (*O.T.C.*), 2nd Lieut., 3rd Batt. King's Own Lancaster Regt., attached to the 1st Batt. of the Gloucestershire Regt. Died of wounds, May 9.

(*T.*) Dennis, S., M.R.A.C., 2nd Lieut., Royal Gloucestershire Hussars.

(*S.*) Dobson, G. M., Lieut., 13th Batt. Cheshire Regiment.

(*S.*) Dobson, W. W., Public Schools Battalion.

Donaldson, H. F., Lieut., A.S.C.

(*T.*) Done, J. P. C. (*O.T.C.*), Pte., Artists' Rifles.

(*T.*) Douglas, B. (*O.T.C.*), Lieut., 5th Batt. Gloucestershire Regt.

(*R.*) Downes, V. C., Lieut., 3rd Batt. Bedfordshire Regt. Died of wounds.

(*S.*) Duckworth, A. C., Capt., 5th Reserve Regiment Cavalry.

Duff, R. G. V., Lieut., Reserve of Officers, 2nd Life Guards. Killed in action.

(T.) Duncan, A. C., F.R.C.V.S. (*O.T.C.*), Lieut., Army Veterinary Corps, Royal Gloucestershire Hussars Yeomanry. Professor of Veterinary Science, R.A.C.

(*T.*) Duncan, W. MacD., Lieut., Leicestershire Yeomanry.

(*T.*) Dunne, F. P. N., Major, Westmorland and Cumberland Yeomanry.

(*T.*) Dyer, G. S. (*O.T.C.*), 2nd Lieut., R.F.A.

(*T.*) Eddison, J. R., 2nd Lieut., 8th Batt. Sherwood Foresters.

(*T.*) Egerton, The Hon. Maurice, Major, Cheshire Yeomanry.

(*S.*) Ellis, W. O. H. (*O.T.C.*), 2nd Lieut., 13th Batt. Royal Welsh Fusiliers.

(*S.*) Evans, F. F. (*O.T.C.*), 2nd Lieut., 8th Batt. South Wales Borderers.

(*T.*) Falcon, G., Capt., Westmorland and Cumberland Yeomanry.

(*S.*) Farrer, D. H., M.R.A.C., Lieut., 7th Batt. Northants Regt.

(*T.*) Farwell, E. W., M.R.A.C., Capt., 4th Batt. Somerset Light Infantry.

(*T.*) Fenwick, J. C., 2nd Lieut., Northants Yeomanry.

Filleul, E. E., Dispatch Rider, B.E.A. Force.

(*T.*) Fillingham, G. A., Lieut., S. Nottinghamshire Yeomanry.

(*T.*) Finch, A. W., M.R.A.C., Lieut., 4th Batt. Yorkshire Regt.

(*S.*) FitzHugh, V. M., Capt., 8th Batt. Sussex Regt.

Forestier-Walker, Ian, Army Service Corps, Mechanical Transport.

Fowler, T. H., Corporal, Hon. Artillery Co. Wounded April, and again June.

(*T.*) Foxcroft, C. T., Capt., 4th Batt. Somerset Light Infantry.

(*R.*) Gaisford-St. Lawrence, T. J. E., 2nd Lieut., 3rd Batt. Seaforth Highlanders. Wounded, under date May 28th.

(*T.*) Gardner, H. C., M.R.A.C., Capt., Staffordshire Yeomanry.

Garside, W. F., formerly Professor Veterinary Science. Veterinary Officer in Charge, R.E. Lines, St. John's Camp, Crowborough.

(*R.*) Gater, C. E. H., Lieut., R.A.M.C.

(*R.*) Gay, W. G. M., 2nd Lieut., 3rd Batt. E. Kent Regt. (The Buffs).

German, G., M.R.A.C., Lieut.-Col., 5th Batt. Leicestershire Regt. (late C.O., retired 1913, now serving as second in command).

(*T.*) Gibbs, G. M., Lieut., N. Somerset Yeomanry.

(*T.*) Gilliat, F. L. (Lieut., R.N.), Capt., Northamptonshire Yeomanry.

(*S.*) Gilmour, D., 2nd Lieut., 7th Batt. Seaforth Highlanders.

(*S.*) Glossop, B., Lieut., 9th Batt. Devonshire Regt.

(*T.*) Glynn, E. F., Major, R.F.A., 3rd Wessex Brigade.

(*T.*) Godman, H., 2nd Lieut., Yorkshire Yeomanry. (Late Lieut. 1st V.B. Yorkshire Regt.)

(*T.*) Godman, Hubert, Lieut., Yorkshire Hussars Yeomanry.

(*T.*) Gooch, E. S., Major, Berkshire Yeomanry. (Late Lieut. 7th Hussars.)

(*R.*) Goodall, G. M. L., 2nd Lieut., 3rd Batt. East Lancs. Regt. Killed in action, May 9th.

Goodwin, J. H., Dispatch Rider, B.E.A. Force.

(*R.*) Gordon-Duff, L., Capt., 3rd Batt. Gordon Highlanders. Killed in action.

(*R.*) Grant, R. C., 2nd Lieut., 3rd Batt. Cameronians. Wounded.

Grant-Duff, H., Lieut., R.N.

(*S.*) Greenwell, R. E. (*O.T.C.*), Public Schools Battalion.

(*S.*) Grice-Hutchinson, C. G., Lieut., 8th Batt. S. Staffordshire Regt.

Grosvenor, Lord Gerald, Lieut., Scots Guards. Wounded.

Gruning, E. L., Lieut., 3rd Batt. Royal Inniskilling Fusiliers.

(*S.*) Hackett, C. B., Capt., 6th Batt. Leinster Regt.

(*T.*) Halsey, R., Major, Hertfordshire Yeomanry.

(*T.*) Handy, J., Sergt., Royal Gloucestershire Hussars Yeomanry. Assistant in Agriculture, R.A.C.

(*S.*) Hartley, H. B., Capt., 6th Batt. Wilts Regt. (Late 2nd Lieut., 93rd Highlanders.)

(*T.*) Hartnoll, J., 2nd Lieut., R.H.A.

(*T.*) Harvey, J. S. (*O.T.C.*), Inns of Court O.T.C.

(*R.*) Hathaway, N. R. (*O.T.C.*), Lieut., Army Service Corps.

(*T.*) Havers, P., Lieut., Surrey Yeomanry.

(*T.*) Hawdon, C. (*O.T.C.*), 2nd Lieut., 4th Batt. Yorkshire Regt.

(*R.*) Hazeldine, H. St. J. C., Lieut., 3rd Batt. Royal Dublin Fusiliers. (Attached 2nd Batt.)

(*T.*) Hazledine, J. T. C., M.R.A.C., 2nd Lieut., 4th Batt Royal Welsh Fusiliers. Killed in action.

(*R.*) Heathcote, R. E. M., Capt., 3rd Batt. Royal Scots. (Attached 2nd Batt.)

Heaven, Capt., E. T., R.F.A.

(*S.*) Hedley, T. F., 2nd Lieut., 15th Batt. Northumberland Fusiliers.

(*R.*) Henniker, A. M., Capt., 3rd Batt. Northamptonshire Regt.

(*T.*) Henry, C. E. F., Capt., Royal Gloucestershire Hussars Yeomanry.

(*S.*) Heydeman, W. E., 2nd Lieut., R.F.A.

(*R.*) Heywood, R. M., 2nd Lieut., 3rd Batt. E. Kent Regt. (The Buffs). Killed in action.

(*S.*) Higson, H., Capt., 17th Batt. Liverpool Regt.

Hill, W. P. H., Capt., Royal Fusiliers. (Attached Royal Military College, Sandhurst.)

Hinds, T., M.R.A.C., 2nd Lieut., 3rd Batt. Northants Regt.

(*R.*) Hippisley, H. E., M.R.A.C. (*O.T.C.*), 2nd Lieut., 1st Batt. Gloucestershire Regt. Killed in action, October 23rd.

(*T.*) Hissey, R. J., (*O.T.C.*), 2nd Lieut., 5th Batt. Royal Sussex Regt.

Hoare, C. M., Lieut., 15th Hussars. Killed in action.

(*S.*) Hoette, A. R., M.R.A.C., Capt., 12th Batt. York and Lancaster Regt.

(*T.*) Homfray, H. C. R., 2nd Lieut., Glamorgan Yeomanry.

(*S.*) Hook, V. (*O.T.C.*), 2nd Lieut., 7th Batt. W. Surrey Regt.

(*T.*) Hooper, K. A. (*O.T.C.*), British Motor Volunteer Corps.

(*T.*) Hope, B., Capt., T.F. Reserve. (Late Capt., Suffolk Yeomanry.)

(*T.*) Hopkinson, A. D. (*O.T.C.*), 2nd Lieut., 4th Batt. Gordon Highlanders. Lecturer in Forestry, R.A.C. Wounded, April, 1915, and seriously wounded later.

(*S.*) Hopton, E. M., Lieut., Shropshire Yeomanry.

Howard-Vyse, R., Capt. and Adjutant, 1st Batt. Loyal North Lancashire Regt.

(*T.*) Huddart, G. W. O., M.R.A.C., Capt., 5th Batt. Yorkshire Regt.

(*T.*) Iredale, E. A., M.R.A.C., Capt., 5th Border Regt.

(*R.*) Jackson, F. E. G., Capt., 3rd Batt. Northants Regt. (Attached 1st Batt.)

(*T.*) J'Aimay, I. B., Capt., Cheshire Yeomanry.

Jeffery, C. G., Capt., 2nd Batt. Yorkshire Regiment. Died from wounds received in action.

(*T.*) Jeudwine, J. H. W., Capt., 3rd West Riding Brigade, R.F.A.

(*T.*) Johns, W. H. (formerly Capt. Westminster Dragoons), Lieut., 6th King Edward's Own Cavalry, Sialkot Brigade, Indian Expeditionary Force.

(*T.*) Johnson, J. G. T., 2nd Lieut., Derbyshire Yeomanry.

(*S.*) Johnson, R. H. K. (*O.T.C.*), 2nd Lieut., Duke of Cornwall's Light Infantry.

(*T.*) Joynson, C., Capt., Warwickshire Yeomanry.

Keane, R. H., M.R.A.C., Naval Division.

Keane, Sir J., Bart., Capt., Reserve of Officers, R.F.A.

(*T.*) Kearney, J. J., Royal Gloucestershire Hussars Yeomanry.

(*T.*) Kennedy, Lord Charles, M.R.A.C., Capt., Ayrshire Yeomanry. (Late Capt., Prince of Wales's Light Horse.)

(*R.*) Ker, D. A. W., Capt., North Irish Horse. (Late Lieut., 6th Dragoon Guards.)

(*R.*) Kershaw, M. (*O.T.C.*), 2nd Lieut., 1st Batt. Gloucestershire Regt. O.C. R. A. College O.T.C. Lecturer in Physics, R.A.C. Missing November 7th. Reported dead by German Red Cross.

King, W., Royal Flying Corps.

Lace, W. H. (*O.T.C.*), Motor Ambulance Driver, Croix Rouge Francaise.

Lane, G. W. B. (*O.T.C.*), Motor Cycle Dispatch Rider, R.E.

(*T.*) Lawson, G., Capt., Westmoreland and Cumberland Yeomanry.

(*T.*) Lees, E. B., Major, Westmoreland and Cumberland Yeomanry.

(*S.*) Llewellin, C. E. (*O.T.C.*), 2nd Lieut., 7th Batt. Wilts Regiment.

Loring, W. L., formerly Adjutant O.T.C.—R.A.C., Lieut.-Col., R. Warwickshire Regt. Killed in action. Mentioned in despatches.

(*T.*) Low, J. L., Capt., 5th Batt. Gordon Highlanders. Wounded.

(*T.*) Lupton, A. C., Capt., Yorkshire Yeomanry. (Late Capt., 4th Batt. (Militia) Yorkshire Regt.)

(*S.*) Macintyre, D., 2nd Lieut., R.F.A.

(*R.*) Mansel-Pleydell, E. M. (*O.T.C.*), 2nd Lieut., 3rd Batt. Dorset Regt. Killed in action.

Margesson, E. W., Major, Reserve of Officers, 3rd Batt. Norfolk Regt.

(*S.*) Mathews, H. S., M.R.A.C., Lieut., 14th Batt. Royal Warwickshire Regt.

(*R.*) Mathias, A. S., M.R.A.C., Lieut., Army Veterinary Corps.

Matthews, R. L., Major (temporary). Train Conducting Officer, Headquarters of Administrative Services and Depts. (Late Monmouthshire R. Reserve Engineers.)

(*T.*) Maxwell, C. H., Capt., 7th Batt. Black Watch.

(*R.*) McDiarmid, K., M.R.A.C., Lieut., 3rd Batt., attached to 2nd Batt., King's Own Scottish Borderers. Killed in action, under date April 20th. Mentioned in despatches.

(*S.*) Meysey-Thompson, A. de C. C., Lieut., R.F.A.

(*T.*) Miers, H. J., Capt., 2nd Batt. Monmouthshire Regt.

(*T.*) Miles, W. H., 2nd Lieut., 4th Batt. Somerset Light Infantry.

(*T.*) Mitchell, F. A., 2nd Lieut., Royal Gloucestershire Hussars Yeomanry.

(*S.*) Mitton, H. (Cy. Sergt.-Major), Capt., 5th Batt. Northants Regt.

(*T.*) Monckton, R. F. P., 2nd Lieut., Montgomeryshire Yeomanry.

(*T.*) Morris-Eyton, R. E., Lieut., 2nd N. Midland Brigade R.F.A.

(*T.*) Morris, W. S. G., Major, Glamorgan Yeomanry. (Hon. Lieut. in Army.)

(*T.*) Mott, W. F., Capt., 4th Batt. Yorkshire Regt.

(*T.*) Mowat, J. G. (*O.T.C.*), 2nd Lieut., 4th Batt. W. Riding Regt.

(*T.*) Murland, J. M. G. (*O.T.C.*), Lieut., Northants Yeomanry.

Murdoch, F. (*O.T.C.*), 2nd Lieut., Army Service Corps Motor Transport.

(*S.*) Murray, E. M., Capt., 8th Batt. Black Watch. (Hon. Lieut. in Army.)

(*T.*) Neilson, W. P., 2nd Lieut., Scottish Horse.

Norris, S. D., Capt., 3rd Batt. Liverpool Regt. (Hon. Capt. in Army.)

Northen, H. A.

(*R.*) Northey, G. E. A., Lieut., 3rd Batt. Essex Regt. Wounded and missing.

Oakes, H. J. L., Lieut., West Riding Regt. Recruiting Officer.

(*R.*) O'Donovan, M. H. (*O.T.C.*), 2nd Lieut., 4th Batt. Royal Munster Fusiliers.

(*S.*) Oldnall, R. W., Capt., 6th Batt. Royal Munster Fusiliers. Hon. Capt. in Army.

Onslow, R. W. B., Lieut., Special Reserve, Duke of Cornwall's Light Infantry.

(*T.*) Paget-Tomlinson, T. R., Major, Westmorland and Cumberland Yeomanry. (Hon. Lieut. in Army.) (Late Capt., W. of Scotland R. F. Res. A.)

Parker, C. P., Lieut., Interpreter.

Parker, W. H., M.R.A.C., 2nd Lieut., Royal Munster Fusiliers. Killed in action, May 9th.

(*R.*) Pease, G. B. R., 2nd Lieut., R.F.A.

Penberthy, J., Capt., R.F.A. (Governor R.A.C.)

Penney, R., Lieut., R.F.A., 1st Wessex Brigade.

(*S.*) Pennington, R. W., M.R.A.C. (*O.T.C.*), Public Schools Battalion.

(*T.*) Pepper, W., Lieut., Oxfordshire Yeomanry.

(*T.*) Perkin, A. L. D., 2nd Lieut., 8th Batt. Middlesex Regt.

Phelps, E. L., Capt., South Irish Horse.

Philips, F. G. P., Capt., 3rd Batt. Shropshire Light Infantry. (Attached 1st Batt. Manchester Regt. (Hon. Capt. in Army.)

(*T.*) Phillips, J. H. S., Major, R. Engineers (Electrical Branch).

(*S.*) Phillips, A. H. R. (*O.T.C.*), 2nd Lieut., Army Service Corps.

(*S.*) Phipps, R. G. (*O.T.C.*), Public Schools Batt.

(*S.*) Pickering, F. H. C. (*O.T.C.*), 2nd Lieut., 5th Batt. Northants Regt.

Pleydell-Bouverie, H., Capt., 5th Dragoon Guards.

Pollok, A. B., M.R.A.C., Capt., 7th Hussars. (Attached 5th Lancers.)

(*S.*) Poore, J., M.R.A.C., 2nd Lieut., 7th Batt. East Lancashire Regt.

Portal, A. W., 2nd Lieut., 3rd Batt. The Queen's Regt.

(*R.*) Power, A. G., Lieut., 3rd Batt. Munster Fusiliers.

Pring, J. G., Lieut., R.G.A.

(*S.*) Prior, H. A. S., Major, 9th Batt. Yorkshire Regt.

(*T.*) Quenington, Viscount, M.P. (Governor of R.A.C.), Hon. Lieut. in Army, Lieut., Royal Gloucestershire Hussars Yeomanry.

(*T.*) Rankin, E. C., 2nd Lieut., Royal Gloucestershire Hussars Yeomanry.

Reade, W. Ll., Lieut.-Col., R.A.M.C.

(*S.*) Reid, R. Serving in Botha's Army, South Africa.

(*T.*) Riley, A. J. A., 2nd Lieut., Army Service Corps.

(*R.*) Robson, J. S., Capt., R.F.A.

(*T.*) Rodd, E. F. S., Capt., W. Somerset Yeomanry.

(*T.*) Roper, C. R. (*O.T.C.*), 2nd Lieut., 6th Batt. Hampshire Regt.

(*T.*) Rycroft, A. R. H., Capt., West Kent Yeomanry.

(*R.*) Saunders, C. B. (*O.T.C.*), 2nd Lieut., 9th Batt. The Buffs (East Kent Regt.).

(*S.*) Saunderson, J. V., Lieut., R.F.A.

Schall, Eric, A.R.A.C., (*O.T.C.*), Inns of Court O.T.C.

(*S.*) Seaton-Winton, Alan (*O.T.C.*), Capt., 12th Batt. Argyll and Sutherland Highlanders. Resigned (July 7) on account of ill-health.

Shann, R. A. (*O.T.C.*), M.R.A.C.

(*R.*) Sherston, T. P. D., M.R.A.C., 2nd Lieut., North Irish Horse.

Shinkwin, I. R. S., Major, A.S.C.

Skipwith, P. A., Major, Reserve of Officers, R.F.A. Commandant of Remount Depôt, Bangalore, India.

Slingsby, A. P., M.R.A.C.

(*R.*) Smith-Barry, R. R., 2nd Lieut., Royal Flying Corps. Severely injured.

(*T.*) Snowball, J. F., 2nd Lieut., 6th Batt. Northumberland Fusiliers.

(*T.*) Sparrow, G. W. S., M.R.A.C., 2nd Lieut., 4th Batt. Shropshire Light Infantry.

(*T.*) Speke, W. H., Major, 5th Batt. Somerset Light Infantry. (Hon. Capt. in Army.) (Retired Lieut.-Col., T.F.)

(*R.*) Spooner, W. P., Lieut., 3rd Batt. Essex Regt.

(*T.*) Spurrier, J. M., 2nd Lieut., 4th North Midland Brigade, R.F.A.

(*S.*) Staples, E. G., M.R.A.C. (*O.T.C.*), 2nd Lieut., 4th Batt. S.W. Borderers.

(*T.*) Steele, G., 2nd Lieut., Northants Yeomanry.

(*T.*) Stenhouse, V. D., M.R.A.C., Major, West Somerset Yeomanry.

(*S.*) Stewart, A. D., 2nd Lieut., 8th Batt. Sussex Regt.

(*R.*) Stewart, R. J., 2nd Lieut., 3rd Batt. The Royal Scots (Lothian Regiment).

(*R.*) Stilwell, C. H., Capt., 3rd Batt. Wilts Regt.

(*R.*) Stirling, J., Capt., 1st Batt. Cameronians (Scottish Rifles). Killed in action; reported January 8th.

(*S.*) Studdy, R. F. B., 2nd Lieut., 11th Batt. Devonshire Regt.

(*R.*) Sudbury, A. H. V., 2nd Lieut., 3rd Batt. Royal Sussex Regt.

(*R.*) Swanwick, R. Kenneth (*O.T.C.*), Lieut., 1st Batt. Gloucestershire Regt. Killed in action.

(*S.*) Symons, G. G., M.R.A.C., Lieut., 9th Batt. Cheshire Regt.

(*S.*) Taylor, J., 2nd Lieut., 10th Batt. Manchester Regt.

(*T.*) Thomas, H. J., 2nd Lieut., Oxfordshire Yeomanry.

Trench, C. S. M., Capt., Commanding Depôt Leinster Regt.

(*S.*) Trusted, G. R. (*O.T.C.*), Public Schools Batt.

Vaughan, C. A., 2nd Lieut., 7th Batt. Seaforth Highlanders.
(*S.*) Vaughan, E. Brettel, M.R.A.C., Sergt-Major, 7th Batt. Queen's Royal West Surrey Regiment.
(*T.*) Verel, J. R., Motor Cyclist in Lovat's Scouts.
(*T.*) Vernon, S. R., M.R.A.C., Capt., 4th Batt. Oxfordshire and Bucks Light Infantry.

(*S.*) Walford, E., M.R.A.C., Public Schools Battalion.
(*R.*) Walker, F. H., Major, 7th Batt. Staffordshire Regt.
(*S.*) Waller, A. J., Lieut., 10th Black Watch.
Waller, Sir W. A., Bart., M.R.A.C., Lieut., 4th Batt. East Kent Regt. (The Buffs).
(*T.*) Wardlaw, A. L., Motor Cyclist in Lovat's Scouts.
(*S.*) Warre-Dymond, G. W., 2nd Lieut., 11th Batt. East Surrey Regt.
(*R.*) Watson, H. T., Capt., 3rd Batt. Liverpool Regiment. Died of wounds in Belgium, March 6th.
(*T.*) Weigall, W. E. G. A., M.P., M.R.A.C., Captain, Lincolnshire Yeomanry.
Weston, L. N. H. (*O.T.C.*), Private, Royal Canadian Regiment.
White, Cecil L., M.R.A.C., Alexandria Light Horse.
(*T.*) Whitehead, F., 2nd Lieut., Duke of Lancaster's Own Yeomanry.
Whittington, A. R., Lieut., A.S.C.
(*S.*) Williamson, E. B. (*O.T.C.*), Public Schools Battalion.
(*S.*) Wilson, E. B., M.R.A.C., Captain, 6th King's Own Yorkshire Light Infantry.
(*T.*) Wilson, Gordon Jacob, 2nd Lieut., Northamptonshire Yeomanry. Killed in action, March 12th.
(*T.*) Wilson, R. W., 2nd Lieut., W. Somerset Yeomanry.
Winch, A. B., Capt., 2nd Dragoons, Adjutant North Devon Yeomanry.

Wright, P., Lieut., Royal Horse Artillery, 1st Cavalry Division.

(*T.*) Wright, W. G., M.R.A.C. (*O.T.C.*), 2nd Lieut., 9th Batt. Argyll and Sutherland Highlanders.

The following, among others, are serving in the Armies of our Allies:

le Gentil, Jacques, Marechal de Loges, 9th Regt. Cuirassiers, French Army.

Mires, R., Italian Army.

Ruspoli, Don Marescotti, M.R.A.C., Italian Army.

Sintier, Georges, Caporal Mitrailleur, French Infantry.

Suares, J., Italian Army.

von Meck, Marc, Lieut., Russian Cavalry.

College Servants.

Hayday, W. H., Sergeant, Royal Field Artillery.

Mitton, H., Capt. (*vide supra*).

Stammer, W. A., Rifleman, Queen Victoria Rifles.

Thornton, W. G., Lieut., Army Service Corps.

MEMBERS OF THE R. A. COLLEGE CONTINGENT OF THE OFFICERS' TRAINING CORPS.

Captain—J. R. Ainsworth-Davis. (Now attached to 3rd Batt. Wiltshire Regiment.)

Second Lieutenant—A. S. Patten.

Corporal—G. de Coundouroff.

Lance-Corporal—I. V. Douglas.

Cadets.

P. Degiardé. J. W. Farmer. H. C. Jackman.

Cadets, Town Members.

H. J. Clappen. T. L. Jones.
Raymond Matthews.

KILLED IN ACTION OR DIED OF WOUNDS.

Second-Lieutenant George Mortimer Langdon **Goodall**, of the 3rd Batt. East Lancashire Regt., was killed in action near Ypres on May 9th. He was at the R.A.C. 1912—1913, and was a good hard-working forward in the XV.

Second-Lieutenant John Turner Clough **Hazledine**, M.R.A.C., F.S.I., 4th Batt. Royal Welsh Fusiliers, was killed on May 9th. Hazledine took the Diploma in 1896 and soon after passed the Examinations of the Surveyors' Institution, where he won the Driver Prize and the Penfold Gold Medal; his professional offices were at the Gateway Chambers, Shrewsbury. J. T. C. Hazledine was a very useful Football player, and in the R.A.C. XV. of 1895.

Lieutenant Kenneth **McDiarmid**, M.R.A.C., 3rd Batt. (attached to the 2nd Batt.) King's Own Scottish Borderers, was killed in action (under date) April 20th. K. McDiarmid was born in 1882, he took the Diploma of the R.A.C. in 1905, and was very useful at most sports, thus he was a good half-back in the XV. and was in the Cricket XI. in 1904.

Second-Lieutenant Wilfred Horsley **Parker**, M.R.A.C., 2nd Royal Munster Fusiliers, was killed in action near Neuve Chapelle on May 9th. He was educated at Marlborough and the R.A.C. Here he had a distinguished career, passing out as Gold Medallist in 1903. He was a very keen forward in the Football team, and in 1903 was in the Cricket XI. He was a Professional Associate of the Surveyors' Institute. W. H. Parker was born October 21, 1882, he formerly lived at The Garth, Stanmore, Middlesex, and was killed in his 33rd year.

Second-Lieutenant Reginald Francis **de Trafford**, M.R.A.C. (*O.T.C.*), of the 3rd Batt. King's Own Lancaster Regiment, but attached to the 1st Batt. Gloucester Regiment, died of wounds received May 9th, near Fromelles. R. de Trafford was an exceedingly useful Student: he took the Diploma in 1913, and also passed the Professional Examination of the Surveyors' Institution, he was in the Hockey team, a whip to the Beagles, and no mean Lawn Tennis player; also an Editor of the *Agricultural Students' Gazette* and Secretary to the Students' Club, esteemed alike by Staff and fellow Students, and a young life deeply deplored. Born December 12th, 1891: formerly of Croston Hall, Preston, Lancs.

In a letter to Mrs. de Trafford, Captain Fagan writes—"Your son was wounded at 4 p.m. on Sunday, 9th inst., and was as soon as possible sent down in an ambulance. Your son was commanding his company at the time when he was wounded. I was in command of the Battalion. As he always did, your son behaved most gallantly on this day, and his loss will be grieved for by every officer and man in the Company. He was in my Company during the whole time that I have been out here, and I can never express to you how good an officer he was and how much I feel his loss."

Notices have already been published, in our last issue, of the following:

Lieutenant St. John Alan Charlton.
Major William Charles Christie.
Lieutenant V. C. Downes.
Lieutenant R. G. V. Duff.
Captain Lachlan Gordon-Duff.
Second-Lieutenant R. Myles Heywood.
Second-Lieutenant H. E. Hippisley, M.R.A.C.
Lieutenant C. M. Hoare.
Captain C. G. Jeffery.
Lieutenant Milton Kershaw.
Lieutenant-Colonel W. L. Loring.
Second-Lieutenant E. M. Mansel-Pleydell.
Captain James Stirling.
Lieutenant Kenneth Swanwick.
Captain H. Trelss Watson, M.R.A.C.
Second-Lieutenant G. Jacob Wilson.

EDITORIAL.

It is our painful duty to inform our readers that since it has been decided to close the College until the termination of the war, it will be necessary to suspend the issue of the *Gazette* during this period; and this is particularly unfortunate as our Magazine is just celebrating its fortieth year of existence.

The *Agricultural Students' Gazette* was started in quarto form in April, 1875, the originators being the Hon. Roger Gordon Molyneux, Mr. Pierce Mahony, and Mr. J. A. Maconchy. Their object as stated in the "Prefatory" was—"to awaken more than a transient interest in some few, at least, of the many who look with favour on an institution in which the motto of 'Practice with Science' has been adopted with considerable success."

In May, 1882, for financial and other reasons, the *Gazette* was reorganised and changed to demy-octavo shape, Mr. J. H. Dugdale being the first editor of the new series. And in this form the *Gazette* has continued up to the present time except that a new cover was designed in July, 1914, and a slightly different spacing adopted.

Other names which must always be connected with the *Gazette* are the late Professor (Sir) A. H. Church, a frequent and valued contributor to the earlier numbers; the late Professor J. A. Harker, who was "Coadjutor" from 1882 to 1895; and Professor E. Kinch, who has occupied that position from 1895 to the present day.

A. S. P.

July 24th, 1915.

Obituary.

E. B. HAYGARTH, SECRETARY OF ROYAL AGRICULTURAL COLLEGE.

Edward Brownlow Haygarth was the youngest son of the Rev. John Sayer Haygarth, Principal of the Royal Agricultural College 1851—1859: he was born at the R.A.C. on April 26th, 1854. On his father's side his ancestors were a notable Yorkshire family (Swarth Gill, Valley of the Clough, W. Riding), his great grandfather, John Haygarth, being a distinguished medical man and pioneer of medical science in the latter part of the eighteenth century and the beginning of the nineteenth, and his grandfather the Rev. John Haygarth, of Upham, Hants. On his mother's side he was descended from the Cirencester families of Cripps, Lawrence, and Harrison, his mother being a daughter of the Rev. Henry Cripps, a son of Mr. Joseph Cripps, for thirty years member of Parliament for the Borough of Cirencester.

E. B. Haygarth was educated at Lancing College, and chose the legal profession, having been articled and admitted as a solicitor he returned to Cirencester in 1880 as a partner to his relative, the late Mr. Charles William Lawrence.

E. B. Haygarth succeeded Mr. C. W. Lawrence as Secretary and Solicitor to the Royal Agricultural College, and through all its subsequent vicissitudes has devoted himself whole-heartedly to the promotion of the best interests of the institution, not only on its academic side—he was for some years lecturer on agricultural law—but also in regard to its sports and social life generally. He laboured assiduously in assisting in carrying out the scheme of reorganisation which, under the present Principal, aimed at placing the College on its proper basis and obtaining for it due public recognition as the premier agricultural educational institution in the Empire, and in the closing weeks of his life he was much occupied with the serious problems which the war has brought upon this as upon all other higher educational establishments. He was honorary secretary of the Royal Agricultural College Club for past students and past and present professors, the charm of whose annual reunions was greatly enhanced by, indeed largely due to, his attractive personality, he missed but two meetings during 34 years.

In the public life of Cirencester Mr. Haygarth has for many years taken a leading share. In 1885, on the death of his uncle, Mr. Edward Cripps, he was elected to fill the casual vacancy thus caused in the Cirencester Local Board of Health, and has remained a member of the governing body of the town ever since. In April, 1899, when the present Urban District Council had superseded the Local Board, Mr. Henry Zachary, an old R.A.C. Student, declined reappointment to the chairmanship which he had long held, and proposed Mr. Haygarth as his successor. This was carried unanimously. He continued to hold the chairmanship to the satisfaction alike of his colleagues and the ratepayers till the annual meeting in 1912, when owing to increasing business calls he sought relief; and the late Mr. O. H. Fowler was elected chairman on condition that Mr. Haygarth accepted the post of vice-chairman. In April of last year Mr. Fowler did not seek re-election, and Mr. Haygarth returned to the post he had so long previously adorned, and it was a gratifying circumstance, as emphasising the general sense entertained by Mr. Haygarth's fellow townsmen of the value of his services, that at the Council election of that year he was returned at the head of the poll. He was a model presiding chairman, courteous, impartial, businesslike, with a gift for terse and direct statement of any matter in hand, and for discouraging undue or irrelevant loquacity on the part of others. He was a member of many other representative bodies, and was concerned with many local institutions. Among these latter was the Cirencester Independent Association for the Prevention of Cruelty to Animals, of which as secretary he has had the direction almost from its foundation by the late Mr. Robert Brewin. He was intimately connected under Mr. Bingham's instructions with the legal steps involved in the establishment and endowment of the Bingham Public Library, including the preparation of the deed of gift under which Mr. Bingham vested the property and funds in the Trustees, of whom Mr. Haygarth was himself one. From April, 1882, till December, 1888, he was a popular subaltern officer of the Cirencester Company of the 2nd Batt. Gloucestershire Rifle Volunteers. Mr. Haygarth was associated with the Cirencester School of Art, of which he was honorary secretary during its closing years. He was also one of the senior members of the old Cirencester Bull Club, and one of the most regular attendants at its monthly gatherings. He was a valued member of the Cotteswold Lodge of Freemasons, having been initiated in 1880, and he filled the Master's chair in 1886, being appointed Provincial Grand Registrar in 1901.

An ardent lover of field sports, and a first-rate exponent of those pre-eminently British, such as football, cricket, and golf, Mr. Haygarth not only enjoyed the countryside for the mere amusement it had to offer, but he was a genuine lover of Nature, being a close, if not a conspicuously scientific observer, especially of bird life, as testified by the list recently published in the *Agricultural Students' Gazette* of the many species of birds he had noted in his own garden at Siddington. As a young man he was a fine Association football player, being an old international representative, while as a cricketer he was even more famed. Almost immediately on coming to Cirencester he was elected captain of the Cirencester Cricket Club, and in 1891, when the late Mr. Charles Sewell resigned the secretaryship of the club, Mr. Haygarth succeeded him for two years, continuing to act as Captain till 1898. Mr. Haygarth's first appearance in Cirencester cricket was in 1879, when he played for Mr. Cripps's XI. against the Town and made a useful score. In 1880, playing for the Town, he made a fine score of 137, and from thence onward he proved himself a safe and reliable batsman, frequently putting together excellent scores in attractive style, and heading the club batting averages in 1881, 1885, 1886, 1887, 1889, 1893, and 1895. He was also a smart and safe wicket-keeper, and as a captain he had few equals, not only by reason of his sound judgment and rare knowledge of the game, but also of his rare tact and fine courtesy. Although retiring from active play as years advanced, he manifested an abiding interest in the Cirencester Cricket Club, and with only one or two exceptions had presided at its annual meetings for the last 34 years. He played for the county of Gloucester on a few occasions, but his professional occupations prevented him from engaging seriously in county cricket. In 1895, the R.A.C. Jubilee year, Haygarth was in the R.A.C. Cricket XI. and won the average bat. In later life the energy which he formerly devoted to cricket he transferred to golf, being one of the founders of the old Sapperton Park Golf Club, of which he was captain and secretary, and when that organisation developed into the Cirencester Golf Club, with in due time the formation of the new course at Baunton, he was one of its mainstays, holding the captaincy for several years, and continuing its secretary up to the time of his death. The R.A.C. Athletic Sports always had a valuable and cheery helper in E. B. Haygarth, who acted as a Judge for thirty years or more. He was an excellent shot, and usually spent a part of his summer holidays on the Yorkshire and Cumberland moors. The now defunct Cirencester Swimming Club and the Athletic Sports of many years ago found in him an enthusiastic supporter and efficient office-bearer.

Nowhere will Mr. Haygarth's loss be more keenly felt than in his own village home at Siddington. An earnest Churchman, Mr. Haygarth was for many years the Rector's churchwarden, and he was also a school manager, chairman of the Parish Council, and for several years overseer, having only just relinquished the last-named office. In fact, anything he could do for the benefit of his neighbours was done by him with a readiness which made all his efforts in that direction appear in the light of a pleasure rather than a trouble. Personally, he was one of the most amiable and genial of men, possessing a keen sense of humour, but ever most considerate of the feelings of others, and displaying a fine old-world courtesy in every relation of life. Such a man will be long and sincerely mourned by the community in which he lived, while with his immediate relatives, and especially with his sister whose life has been spent with him, the deepest sympathy is felt in a loss which is irreparable

Mr. Haygarth underwent a severe operation last October. After a necessary rest of some weeks he returned home and resumed work, but shortly after sustained a very severe chill, influenza—from which he had previously been immune—supervened, and though he continued to do much of his work he never really recovered his strength, and he passed away on April 14th in the 61st year of his life and 35th of his work in Ciceter.

To generations of the Staff and Students of the R.A.C. E. B. Haygarth has been a true friend and counsellor, he never entered a room but the atmosphere became more genial and brighter, and we may safely say that all who came in contact with him became better men and better citizens.

SIR ARTHUR HERBERT CHURCH, FORMER PROFESSOR OF CHEMISTRY AT THE ROYAL AGRICULTURAL COLLEGE.

We greatly regret to record the death, at Shelsley, Kew Gardens, of Professor Sir A. H. Church, on Monday, May 31st, within two days of completing his 81st year. He was educated at King's College, London, the Royal College of Chemistry, and Lincoln College, Oxford, where he took a First Class in the Natural Science School. Sir Arthur Church was M.A. (Lincoln College), D.Sc. (Oxon, 1901), F.I.C., F.R.S. (1888), F.S.A., and created K.C.V.O. in 1909 : he was President of the Mineralogical Society for three years.

In 1863 he was appointed Professor of Chemistry at the Royal Agricultural College, which post he held till 1879, and during that time he accomplished much of his more purely scientific work. In 1879 he married, left Cirencester, and was appointed Professor of Chemistry to the Royal Academy of Arts, which he vacated in 1911 ; from 1880 for many years he was Lecturer on Organic Chemistry at the Royal Indian Engineering College at Cooper's Hill, until its dissolution.

Sir A. H. Church was a man of many parts, a highly cultivated and distinguished man both in the realms of science and of art. He is well remembered in Cirencester not only in connection with the R.A.C., but in other directions, such as the Corinium Museum. His writings and scientific papers are very numerous and include the editing in collaboration with his colleague at the R.A.C., (Sir) W. T. Thiselton-Dyer, of an English edition of S. W. Johnson's " How Crops Grow " ; " The Laboratory Guide " specially arranged for Agricultural Students, now in its ninth edition, the later editions having been revised by the present Professor of Chemistry, R.A.C. (Professor

E. Kinch), who was a former Assistant to Professor Church at the College; the editing and revising of "The Chemistry of Common Life," by J. W. F. Johnston; "Food," some account of its sources, constituents, and uses, published for the Committee of Council on Education, also "The Food Grains of India" for the same Committee; "The Chemistry of Paints and Painting," a new and revised, 4th, edition of which was published only a few weeks ago. He was the discoverer of turacin, an animal pigment containing 7 per cent. of copper from the feathers of the turaco or plantain eater, and described several new mineral species, especially some of Cornish origin, one of which, a cerium phosphate, is known as Churchite; other researches were on vegetable albinism, the colouring matter of the *Coleus*, the presence of aluminium in vascular cryptogams.

Sir Arthur Church investigated the growth of the sugar beet at Cirencester for several years, especially in 1870 and 1871, and received a gold medal from the Highland and Agricultural Society of Scotland for an essay on the subject. He was consulting chemist to the Cirencester Chamber of Agriculture, and frequently addressed it on matters connected with agricultural chemistry. He was also curator of the Corinium Museum for several years, and wrote the "Guide" to it. His assistance to the Museum was invaluable and continued to the end, the "Guide" having been revised and reprinted by him but a few months ago.

Sir Arthur Church was a leading authority on the chemistry of painting, and gave most valuable assistance in the work of preserving the wall paintings in the House of Lords; also he advised in preserving the stone work of many historical buildings, including St. Paul's Cathedral and Westminster Abbey.

But this list of works by no means exhausts the activities of Sir A. H. Church. He wrote books for the Science and Art Department on Precious Stones, on English Pottery and Porcelain, and a text book on "Colour" and a memoir on "Josiah Wedgwood." He made collections of various kinds of works of art, especially of English pottery, of precious stones, of embroideries, and more recently of Oriental art work, he had a fine and representative collection of *tsuba*, Japanese bronze and other metal sword guards. In all such things he had both a scientific and an artistic interest. He was no mean artist, and in his younger days exhibited at the Royal Academy. He was a frequent contributor to the earlier volumes of the R.A.C. *Agricultural Students' Gazette.*

In later years he prepared for the Royal Society a classified list of papers and letters in the Society's Archives, the result of much labour and research and of great value as a reference to the earlier work of the Society.

The College Chapel has a small example of William Morris' stained glass, presented by Professor Church.

Sir Arthur Church will be much missed by all men of science and of art who knew him, and by a large circle of friends on account of his personal charm, his wide culture, and his kindness.

We greatly regret to record the death of Andrew RUTHERFORD, M.A., B.Sc. (Edin.), who was Lecturer and Demonstrator in Natural History at this College 1907—1909. In 1906—1907 Rutherford was Demonstrator in Zoology at Edinburgh University ; on leaving the R.A.C. he became Lecturer in Agricultural Botany and Zoology at the University College at Cardiff, and in 1911 received an appointment under the Carnegie Fund for Research Work in Entomology in the United States, in 1913 he was appointed Government Entomologist in Ceylon. He died on February 3rd, 1915, in Ceylon, of enteric fever. Born March 24th, 1879. All Rutherford's work was marked by its painstaking and conscientious thoroughness, and his death cut short what promised to be a very useful and successful career. He left a widow and infant boy.

It is with sincere regret that we record the death of Mr. Herbert John MARSHALL, of Gayton Hall, Ross-on-Wye, on June 16th, 1915. He was born December 31, 1833, and was a Student of the R.A.C. in 1858 and 1859. H. J. Marshall entered the Navy in 1847 and retired in 1857, when he turned his attention to agriculture and studied first in Scotland and then at the R.A.C. On leaving the College he took Poulton Priory and farmed this and some adjoining land for over 30 years. In 1891 he bought Gayton Hall, Ross, and continued to farm there : he was a J.P. and County Councillor for Herefordshire. Whilst residing at Poulton he was one of the leaders of scientific agriculture in this district, a leading member of the Cirencester Chamber of Agriculture, of which he became President, and to which he contributed many papers on practical agricultural matters and on agricultural education. Since his residence at Gayton Hall, where his property includes extensive woods, he took great interest in Forestry and in improving his own woods, and in trying to increase the interest in forestry in his own neighbourhood and in the country generally. He instituted an annual Arbor Day in Herefordshire and won the prize for a planted covert in connection with the Royal Agricultural Society's Show at Gloucester. He was a keen sportsman and, whilst in this district, hunted with both the V.W.H. packs and with the Heythrop hounds. Mr. Marshall always retained a strong interest in the R. A. College ; he was the father of Mrs. Bruce Swanwick.

We regret to notice the death, in June, of Second Lieutenant Tom Rethman Mills, 6th Battalion Manchester Regiment, at the Dardanelles, on June 10th. He was well known by a large number of R.A.C. men in connection with Cricket. In 1911, 1912, and 1913 he brought a Team to play the College XI.

We regret to record the death, on April 23rd, at Lemnos, from the effects of sunstroke, of Rupert Brooke, the poet, a sub-lieutenant in the Royal Naval Division. Born August 3rd, 1887. Died April 23rd, 1915. A young life full of promise, joyfully laid down for his country. A sonnet of his was printed, by permission, in our last issue.

TWO SHORT FABLES.

The Student and the Syllabus.

A certain Student of Agriculture was smitten with the Awful Habit of Learning Things by Heart. Now it so happened that in Connection with a certain Subject a Syllabus had been set up by one of the Wise Men of Ancient Times. And the Student was wont to Bow Down and Worship before the Syllabus and to plant in his

Memory by means of Vain Repetitions and Midnight Oil the Things written thereupon. Now it came to pass that from Time to Time the Wise Man who prophesied in this Subject would say :—

> " Behold, these Things are not inscribed upon the Syllabus, yet it is Good for you to know them."

But this Foolish Student said to himself :—

> " For what Purpose is this Syllabus if I may not put my Trust in it. Surely the Taskmasters of the Examinations, being External, will also worship the Syllabus. There is no Need to vex my Brain with these other Matters."

And so he took no Note of the Words of the Wise Man and held Pleasant Converse with his Neighbour. But the Wise Man noted these Things in his Heart. And when the Time of Examining was come, having also a Finger in the Pie, he did sorely vex the Foolish Student with subtle questionings to the End that he might Prove his Knowledge and not his Memory. Which thing was grievous to the Student who cursed all Things from the Wise Man to the Syllabus. And he left the Place of Examination muttering " These Things are not written in my Notes, neither are they inscribed upon the Syllabus, lo, I am undone." And he was counted among the Third Class.

The Landowner and the Wise Men.

A Certain Landowner had a Field whereon no Herb would grow. And saying to himself What Profit is it that My Land is a Resort for Conies, he hied him to certain Wise Men, skilled in the Art of Growing Two Blades of Grass where there was Manifestly Room for One only.

The First Wise Man spake of Cumulative and Inherent Fertility and at Some Length indicated that What he Meant to Say was that Success depended upon Many Things, and that it was a Matter for the Alchemist.

This Second Wise Man, or Alchemist, was less Voluble than the First Wise Man. Saying merely " Give me, prithee, but a Handful of the Refractory Soil," he retired unto his Private Room and with the Aid of Pipkins and Retorts practised Various Incantations, the Knowledge whereof is hidden from the Eyes of Ordinary Men.

But the Landowner, impatient at the Delay, went unto the Third Wise Man, or Agrostologer. Now this Agrostologer went Mainly on his Belly, and so progressing to the Field aforementioned, he held Privy Converse with Mother Earth. Also he made an Account and accumulated Many Figures with which he Juggles on Occasion even to this Day. But he caused to grow on that Field only Burnet and Similar Garbage.

Our Landowner, therefore, getting No Change out of these three Wise Men sent finally for the Forester (which means Fourth Wise Man methinks). And this Forester having viewed the Land said: "Aha, verily here is a Place for the Growth of Pit Props." Which Speech pleased the Landowner so that he gave unto the Forester a Change of Raiment made from the Skin of Goats. But when in the Fulness of Time the Pseudotsugata, Chamnecyparides, and Whatnot died also, then was the Landowner vexed. And crying with a Loud Voice unto Christopher the Turner he said: "I have No Use for these Wise Men; come, take my Land and grow this Corn of which you make Talk that the Mouths of the Belgians may be filled.

But the Land is even to this Day devoured by the Conies.

EXPERIMENTS ON PERMANENT GRASS LAND, 1915.

FIELD NO. 13.

Experiments were continued on the 20 plots, each $\frac{1}{20}$ acre, used the last twenty-four years or more (see *Agricultural Students' Gazette*, April, 1889, August, 1889 and 1890, December, 1891, August, 1892, 1893, and 1894, July, 1895, August, 1896 to 1903, December, 1904, and August, 1905 to 1913, and July, 1914), the manures applied to each plot being the same in kind and in amount as in the previous years, excepting that on A_3 and B_3 the manure was withheld since 1911, and the kainite on plots 2, 5, 6, 8, 10 and 11 was not given this year.

The manures and their amounts per acre are given below.

This is the twenty-eighth year in succession for the application of the same manures to plots 1—14, the twenty-seventh year of the farm-yard manure plots, and the twenty-fourth year of the application of Thomas' basic slag.

The farm-yard manure, 12 tons per acre, and the basic slag, 10 cwt. per acre, were applied on January 16th; the superphosphate, 5 cwt., on February 16th; the guano, 5 cwt., and the ammonium sulphate, 2 cwt., on April 19th; and the sodium nitrate, 2½ cwt. per acre, on May 4th, 1915.

The guano, Peruvian, contained combined nitrogen 9·8 per cent. equivalent to ammonia 11·9 per cent., phosphates 23·6 per cent., and potash about 2·3 per cent.

The superphosphate contained 26·2 per cent. of "soluble" phosphate.

The sodium nitrate, and the ammonium sulphate were of good commercial purity.

The basic slag contained phosphates equivalent to 38·5 per cent. of tricalcic phosphate.

The grass was cut on June 15th, and the hay weighed on June 18th: the hay was harvested in perfect condition.

The yield of plots, calculated to amounts per acre, was as follows:

		Per cwt.	Excess over Unmanured plot. cwt.
A3.	Rape meal (for 20 years to 1911) ...	22	6·2
A2.	Thomas' basic slag	23	7·2
A1.	Farm-yard manure	37·9	22·1
1.	Sodium nitrate	17·3	1·5
2.	Kainite (for 28 years to 1914)	13	—
3.	Guano	22	6·2
4.	Superphosphate and ammonium sulphate	26·3	10·5
5.	Kainite (till 1914) and superphosphate ..	23·2	7·4
6.	Kainite (till 1914), superphosphate, and sodium nitrate	26·7	10·9
7.	Unmanured	15·8	—
8.	Kainite (till 1914), superphosphate, and ammonium sulphate	33·4	17·6
9.	Ammonium sulphate	25·3	9·5
10.	Kainite (till 1914) and sodium nitrate...	23·3	7·4
11.	Kainite (till 1914) and ammonium sulphate	26·2	10·4
12.	Guano	33·5	17·7
13.	Superphosphate	21·4	5·6
14.	Superphosphate and sodium nitrate ...	34	18 2
B1.	Farm-yard manure	41	25·2
B2.	Thomas' basic slag	22	6·2
B3.	Rape meal (for 20 years to 1911) ...	22·3	6·5

Some of the meteorological observations during the first half of the year are given below :—

	Rain. Inches.	Rainy days.	Average Rainfall, 40 years.	Mean temp. F°.	Days of frost on grass.
January ...	4·49	22	2·52	37°7	14
February ...	5·03	20	2·27	37°6	14
March ..	1·39	9	2·01	40°4	15
April ...	1·16	13	1·97	44°8	6
May ...	3·36	12	2·08	51°2	2
June to 8th	·32	2		58°9	0
	15·75	78			

In May 1½ inch fell on 17th, and 3·1 inch from 12th to 17th. From May 21st to June 6th only ·01 inch fell on June 2nd, and on June 7th ·31 inch. During 17 days to June 6th it rained only on one day (June 2nd), and on June 8th another dry spell set in and it was rainless for 16 days.

The low rainfall in April and from the middle of May onwards is responsible for the comparatively low yield, which however was higher than last year.

The highest yields were given by the two farm-yard manure plots, about 2½ times that of the unmanured, which was 15·8 cwt. per acre, and generally the yields were better on the more retentive soil to the E. of the field than on the more brashy soil to the W.

The unmanured plot gave ½-cwt. more than last year, and the mean yield of all the plots—25½ cwt.—was about 3 cwt. more than last year, but about 4 cwt. less than the mean of the whole time of the experiments.

The guano plot on the heavier part of the field gave a good yield —33½ cwt.—of excellent hay. Superphosphate with nitrate and superphosphate with ammonium sulphate (and potassic residues) also gave 33 cwt. of hay.

Generally the ammonium sulphate gave rather better returns than the corresponding plots with sodium nitrate. Sodium nitrate alone has evil effects on the grass, but ammonium sulphate alone is not so injurious here. The residues of previous manuring for 20 years with rape cake, discontinued after 1911, gave an increase of 6 cwts. of hay. The increase on the basic slag plots was 6-7 cwts., rather more this year than on the superphosphate alone plot, where it was 5½ cwt., but the weight of slag given is double that of the superphosphate. The hay from the plot with superphosphate and residues of potash salts was exceedingly rich in *Leguminosæ.*

After hay harvest the whole plot was grazed with cows.

E. K.

THE IRISH TOBACCO INDUSTRY.

(By Sir Nugent Everard, Randlestown, Navan.)

There is no insuperable difficulty in re-establishing in Ireland the tobacco-growing industry, of which she has been unjustly deprived for almost a century by the arbitrary action of the English Parliament. In 1907 an Act was passed repealing all former Acts prohibiting the cultivation of tobacco in Ireland, and on payment of five shillings for a license any farmer can grow as many acres as he pleases.

No doubt I shall be asked why nobody has taken advantage of this Act except the original experimenters. The answer is very simple : the tobacco industry is so highly specialised that no grower of tobacco could attempt to place his crop upon the British market in the bone dry condition necessitated by the high duty on all kinds of unmanufactured tobacco. Our pioneer growers had to provide themselves, or get the Department of Agriculture to provide them, with an equipment for rehandling, as it is called, consisting of steam boilers and drying rooms, and hydraulic and other screw presses that could dry and pack the tobacco off many more acres than they were permitted to grow. In fact, in America, it is a very small rehandling factory that is not capable of dealing with the crop from a thousand acres.

Then again, although tobacco growing has been carried on for the last eight years in seven counties, no attempt has been made to train native experts in the details of cultivation and curing of tobacco so that they might spread the light to other parts of Ireland. If a farmer in Cork or Antrim wished to grow tobacco he would have to depend on the excellent series of pamphlets supplied by the Department of Agriculture and written by their tobacco expert, Mr. G. N. Keller.

The pioneers of the movement were given a subsidy, though this was really no more than the equivalent of the extra trouble and expense they were put to by the Excise authorities, for the crop has to be grown in bond as it were: but this terminated in 1913, and the problem since has been to utilise the experience that they have gained for the benefit of their neighbours, and to make a larger use of the rehandling equipment with which they are provided, and it is clearly on these lines that the movement must progress. And indeed the movement is now well under way since in 1910 there were but 5 new small growers, in 1911 there were 15, in 1912 there were 53, and in 1915 about 160.

It has been found by costly experiments that the elaborate barns fitted with adjustable ventilators and steam pipes so necessary in the dry atmosphere of America are not needed with the Irish climate and all that the grower needs for the first stage in the preparation of pipe tobacco is a portable shed made of deal framework roofed with tarpaulin and covered at the sides with canvas, the whole costing less than £10 to deal with an acre of tobacco: and any waste timber or the "scraws" of a bog will supply the smoke required to kill the mould spores, and improve the texture and colour of the leaf. And after this the tobacco is transferred to the rehandler.

The rehandler undertakes to provide the technical instruction necessary for all operations connected with the crop from the seed bed to the curing barn, to see that the new growers are provided with the necessary equipment for raising the seedlings and curing the crop, to purchase the tobacco when cured and to rehandle and prepare it for the market. For these services the rehandler is given a grant, but the same encouragement could be given by means of protecting duties, which according to John Stuart Mill, the great apostle of Free Trade, is "the least inconvenient mode in which the nation can tax itself for the support of such an experiment." He adds: "It cannot be expected that individuals should at their own risk, or rather to their certain loss, introduce a new manufacture and bear the burden of carrying it on until the producers have been educated up to the level of those with whom the processes are traditional." But at the present time while in all other tobacco growing countries the domestic product is duty free or only very lightly taxed, tobacco grown in this country has to pay within 4 per cent. of the duty levied on foreign tobaccos.

The results of the rehandling experiments have been very satisfactory—even small farmers with a few acres of bogland have been able to produce a good class of tobacco for which a price has been paid by the rehandler on the valuation of the Department's tobacco expert that gives a remunerative return for the labour of the farmer's family thereon.

However, the main point is: at what point have we arrived in proving the suitability of the tobacco industry to the soil and climate of Ireland? And the best answer is to give the results from the first farm on which tobacco was grown, at Randlestown, Co. Meath:—

	1904.	1911.
Number of acres grown	20	27
Average yield of tobacco per acre in lbs. ...	440	1500
Cost of production per lb.	1/3	4½d.
Price realised per lb.	4½d.	5½d.

The economic advantages of the crop are obvious: it provides employment at times of the year when other farm work is slack, thus enabling a farmer to provide continuous work for his labourers all the year round, instead of having to pay high wages for casual labour at harvest and other times. And perhaps a more important point is that the nature of the work makes it possible to employ all the boys and girls above school ages.

As to the advantages to a country that can provide its own raw material in so important an industry as tobacco manufacture there is no need to dilate. The wages earned in producing the raw material would run into millions of pounds sterling if Ireland grew all the tobacco she needed for her own consumption, for out of £22 or so per acre that tobacco costs to grow in Ireland as much as £6 14s. is paid in wages, even at Irish rates of 10s. a week.

As to quality the testimony of one of the largest manufacturers in Ireland is that it is equal in colour and flavour to the best products of Kentucky, and to emphasise the point, a price was recently offered for Irish leaf by another firm equal to the very highest price given for imported produce of the same description.

V.

The Irish Tobacco Co., Limited, of Dublin, was established for the special purpose of placing Irish tobaccos before the public in their most attractive forms, and the results obtained have fully justified the anticipations formed of the excellent qualifties of the native product.

Also owing to the organic matter left by the large root residues of the plant, and the residues from the heavy artificial manuring, tobacco is an excellent soil improver.

To sum up, the tobacco crop will never make big profits owing to the heavy taxation, unless some day we have a Government really in sympathy with the farmer, but its value will lie in the fact that the proportion of the gross return to the rent is large, and when there is so much money at stake the openings for skill are considerable, and it must be remembered that every pound of Irish tobacco smoked represents a surprising amount of employment given to Irish hands in field and factory.

DIPHTHERIA IN COWS.

It is a disputed point whether the milk of the cow ever contains the true diphtheria bacillus.

It has been stated that the cow has never been known to suffer from diphtheria and that outbreaks of diphtheria traced to the use of cow's milk were due to the introduction of the diphtheria bacillus by the milkers and not to a diseased cow.

Recently my attention was called to a small outbreak of mild diphtheria in a village. A boy developed the disease and infected the nurse. Three other people in another house were infected at the same time, and all consumed the milk from three cows. All sources of infection were excluded except the cows' milk.

Samples of the mixed milk were taken and centrifuged for one hour in a high speed electric centrifuge and the sediment examined microscopically and by culture and also by inoculation into guinea-pigs for the diphtheria bacillus.

Microscopically and by culture numerous diphtheria-like bacilli were detected. The inoculated animal died, and, on a *post mortem*, showed typical signs of being infected with the true diphtheria bacillus.

The cows were then inspected and one was found to have small vesicles on the udder covered with a brown crust. The other animals were free from disease of the udder.

Milk was taken from the cow with the diseased udder and material was removed from the vesicles and subjected to bacteriological examination with the result that typical diphtheria bacilli were detected. Milk from the other (healthy) cows was examined similarly with negative results. The cow was therefore producing milk infected with typical diphtheria bacilli and consumers of the milk contracted diphtheria.

The diseased cow was not ill, the udder was not seriously affected, and the farmer did not suspect that there was anything seriously the matter with the cow and allowed the milk to be sold for human consumption.

Many outbreaks of diphtheria occur, and in the vast majority there is no evidence of the origin of the outbreak.

If an outbreak of diphtheria occurs and the origin of the outbreak cannot be determined, the milk supply should be investigated and the cows examined.

If any animal has suspicious lesions of the udder, it should be isolated and the milk and material from the vesicle examined bacteriologically and by inoculation into the guinea-pig.

The matter is of great importance to many farmers and I therefore propose describing the diphtheria bacillus in some detail.

The diphtheria bacillus was studied by Klebs and Loffler, hence its name—the Klebs-Loffler bacillus—which distinguishes it from other and very similar bacilli which may be quite harmless.

This organism is the cause of the disease known as diphtheria, which is distinctly a disease of the young, especially at the ages from two to ten years. It is an infective disease, and may occur in all grades of severity. It may be so mild as not to be recognised and yet the patient may infect others more susceptible.

It is stated that the Klebs-Loffler bacillus has been isolated from the throats of nearly seven per cent. of the presumably healthy population and that these "carriers" are probably the chief cause of the spread of the disease.

The bacillus is small, with rounded ends, measuring 3μ or 4μ in length. It is non-motile and does not form spores. In size it varies considerably under cultivation. Some of the bacilli on cultivation develop a swollen end (clubbing) and show parallel grouping. This latter formation is also seen in membranes from an infected throat. The bacilli increase by the simple process of division and thread or branching forms are very rare.

The diphtheria bacillus stains readily with the ordinary aniline dyes and is Gram positive. Material such as membrane from the throat, diseased udder, sediment from milk, cultures, etc., should be examined by Loffler's alkaline methylene blue stain, by Gram's process, and by Neisser Tanner's process.

The suspected material is spread over three ordinary clean microscopic slides, dried in a warm place, and when quite dry passed through the flame of a bunsen burner some 8 or 12 times. This will fix the material to the glass slide. The heating must not be too great, otherwise the staining will not be satisfactory. One of the fixed slides is now immersed in warm Loffler's alkaline methylene blue stain for five minutes, well washed with tap water, dried and examined with a 1-12th oil immersion lens without being covered with a cover glass. The bacilli will be stained blue; the staining is irregular, more deeply stained portions alternating with pale intervals (segmentation). The ends are also frequently deeply stained (the so-called polar staining), while the phenomenon known as "meta-chromatism" is often very marked both at the poles and also in the rod, this meta-chromatism appearing as granules of a purplish tint which contrasts strongly with the blue stain.

Loffler's alkaline methylene blue stain is prepared as follows :—

Saturated alcoholic solution of methylene blue	30 c. c.
KOH solution ·01 per cent.	100 c. c.

The stain keeps well and may be used for staining all bacteria.

Another fixed slide (as prepared above) is stained by Gram's process. The stain is prepared as follows :—

Saturated alcoholic solution of Gentian violet	1 part.
5 per cent. aqueous solution of Carbolic Acid	10 parts.

This keeps fairly well.

The second solution of the stain is prepared as follows :—

Iodine	1 part.
Potassium Iodide	2 parts.
Water	300 parts.

(The Iodine is placed in a dry bottle and the solid Potassium Iodide added with a few drops of water. The Iodine will readily pass into solution. When this has occurred add the remainder of the water, but not before.)

The fixed slide is immersed in the first solution (Gentian violet and carbolic acid) for five minutes, washed roughly with water and then immersed in the iodine solution for two minutes. The stained material should be of a dirty yellow brown colour. Now remove from the iodine solution and immerse in methylated spirit until no further stain is extracted (about 2—3 minutes). Wash, dry, and examine with 1-12th oil immersion lens.

The Diphtheria bacillus will stain darkly. Bacilli similar to it will not retain the stain if treated as described above but will appear under the microscope as unstained rods. These latter bacilli are known as being Gram negative whereas the true diphtheria bacillus is Gram positive.

The third stain is the Neisser Tanner stain, and is very important because a few diphtheria bacilli can be detected when mixed with a vast number of other micro-organisms. It is prepared as follows :—

One gramme of methylene blue (Grubler's) is dissolved in 20 c. c. of 96 per cent. alcohol, to this is added 950 c. c. of water and 50 c. c. of glacial acetic acid.

Two grammes of Bismarck brown are dissolved in one litre of boiling water and the solution filtered. A mould may develop in this solution, but the methylene blue solution keeps well.

The fixed slide is placed in the methylene blue solution for five minutes, washed with water and then immersed in the Gram Iodine solution described above for one minute, washed with water and then immersed in the Bismarck brown solution for three minutes, washed, dried, and examined with 1-12th oil immersion lens. The diphtheria bacillus is stained faintly brown and contains two and sometimes three inky-blue spots. A few diphtheria bacilli mixed with many other organisms may, after some experience, be readily detected.

If diphtheria-like bacilli have been detected by the (three) above-mentioned processes further experiments must be made because there are bacilli which give the above reactions, or some of them, which are probably not the true Klebs-Loffler or diphtheria bacilli.

These further tests are of great importance, and must be carried out. The suspected organism must be cultivated on certain culture media, and when isolated, inoculated into a guinea pig to prove whether it is virulent or not.

CULTURAL REACTIONS.

The true diphtheria bacillus grows well in the presence of air at blood heat. It flourishes in milk, rendering it acid but without curdling. (Good fresh milk is boiled, neutralised with NaOH and tinted with sterile litmus solution.)

On Agar, cream coloured colonies develop somewhat flattened and with irregular margins. On blood serum, after 18—24 hours' incubation, small opaque colonies develop. On this medium the diphtheria bacillus grows well and it is used for isolating the bacillus. The medium is prepared as follows :—

Collect fresh cow's blood in sterile flasks, let stand overnight in a cool place : pour off the clear serum from the blood clot and add one part of glucose broth to three of this serum.

(The glucose broth is prepared as follows :—Lemco, 5 grammes ; salt, 5 grammes ; peptone (Witte's), 10 grammes ; glucose, 10 grammes—made to a litre with tap water and rendered neutral to litmus paper with normal NaOH. sterilised by steaming.)

The mixture of glucose broth and serum is placed into test tubes and arranged in a sloping position on the shelves of a serum inspissator (a hot water oven) and the temperature raised to 50°C. for about thirty hours, the temperature is then raised to 65°C. for six hours, when the serum coagulates. This material is known as Loffler's blood serum.

Suspected material, such as the sediment obtained on centrifuging milk, swabbing from the throat, or from a diseased udder, is spread thinly on the surface of the blood serum in the tube by means of a platinum wire, the mouth of the tube sealed with the sterile cotton wool and the tube placed in the blood heat (37°C.) incubator for 18 to 20 hours.

The diphtheria bacillus in that time will develop on the surface of the serum forming small opaque colonies which are not coloured. A portion of the growth is removed by means of a sterile platinum wire with a loop at the end and three slides prepared as described above and stained by (*a*) Loffler's alkaline methylene blue, (*b*) Gram's stain, and (*c*) Neisser Tanner's stain.

If diphtheria-like bacilli are detected and the material has been taken from the throat of man there is little doubt that the case is one of diphtheria. But if there is any doubt and diphtheria-like bacilli have been detected in a milk sediment or from a diseased udder we must proceed to make an inoculation experiment which will definitely assist us in coming to a conclusion whether the true diphtheria bacillus is present, and also whether it is virulent or not.

The suspected material must be spread out on to Loffler's blood serum—for preference in a large petri dish—and incubated at blood heat for 18—20 hours. Any suspicious colonies are removed and a blood serum tube inoculated and incubated. After 20 hours incubation a portion of the material is removed and three slides prepared and stained as above. If nothing but the diphtheria-like bacillus is present we proceed as follows :—

Two guinea pigs (short haired) of 250—300 grammes weight are each inoculated with 2 c. c. of a 48 hours' broth culture of the suspected bacillus ; one of the animals at the same time receiving 1 c. c. of diphtheria antitoxin.

If the guinea-pig inoculated with the culture only dies, while the one receiving culture and antitoxin lives, this is complete proof that the organism is the diphtheria bacillus ; if both live no inference can be made except that the organism is non-virulent to guinea-pigs ; if both die it shows that the organism is virulent, but that it is not neutralised by antitoxin, and therefore is not the diphtheria bacillus.

A guinea-pig inoculated with a virulent broth culture of the true diphtheria bacillus usually dies within three days, and at the seat of inoculation haemorrhagic oedema forms, haemorrhages occur in the serous membranes and especially in the adrenals. As these inoculation experiments frequently cannot be made, further tests must be made in order to distinguish between the diphtheria-like bacilli and the typical Klebs-Loffler bacillus.

Blood serum is taken (one part), water three parts and 1 per cent. of carbohydrate added (See Table.) The whole is made neutral to litmus and tinged with litmus solution and heated to boiling in a steamer for 15 minutes on three consecutive days. The fluid is tubed and inoculated with the suspected organism and incubated at blood heat. The reactions of the various diphtheroid bacilli are given in the following table :—

ORGANISM.	MEDIUM AFTER 10 DAYS' GROWTH.								
	Glucose.	Lactose.	Sucrose.	Galactose.	Maltose.	Lævulose.	Mannitol.	Dextrin.	Glycerin.
B. diphtheriae, virulent and avirulent... ...	C A	C A	0	C A	C A	C A	0	C A	C A
Hofmann bacillus*	0	0	0	0	0	0	0	0	0
Xerosis bacillus* ...	C A	0	0	0	0	C A	0	0	C A
B. coryzæ*	C A	0	0	C A	0	C A	0	0	0
Diphtheria-like bacillus From ear* ...	0	0	0	0	0	0	0	0	0
From the urethra* ...	A	0	0	A	A	A	0	0	0
From the throat*	C A	0	0	C A	— A	C A	0	0	0
From the fowl ...	— A	0	0	— A	— A	...	0	0	0

* Avirulent to the guinea pig.

C = Coagulation ; — = No Coagulation ; A = Acid ; 0 = No Reaction.

CECIL DUNCAN, F.I.C.

The Shire Hall, Worcester.

NOTES ON REARING INCUBATED CHICKEN WITHOUT ARTIFICIAL HEAT.

Some people might be inclined to discredit the statement that chicken can be reared from the shell without any artificial heat whatever—from March onwards—with perfect success, but this has been proved by experience both in America and in England.

The necessary outlay to commence this method of rearing chicken is far less than that for the usual one of using heated brooders, and is further reduced if the needful appliances are made at home, as they can be very easily by anyone with an idea of carpentry. There are several forms of fireless brooder in use, but perhaps the simplest and least expensive is the one here described, which has been made complete for 5s., and will rear a maximum of 30 chickens from hatching until six or eight weeks old.

This brooder consists of a wooden box 20in. by 15in., divided in the middle by a partition, with two woollen mop-heads suspended from a cross bar, and with circular holes covered with perforated zinc cut in the sides of the box to admit air : the box has a loose-fitting lid. Each of the compartments will hold 15 chicken, which are kept warm under the mops by their own heat. This box requires protection from the weather by being placed in a well-made brooder sufficiently large to allow the chickens a run out without being exposed to the weather. The floor of the brooder should be covered to a depth of several inches with a mixture of sand or dry earth and chaff, in order to keep the chicken off the wooden floor—which is prejudicial to their health—and to provide them with scratching material by which they can be kept employed searching for their food.

The idea of partitioning the brood box is to economise space by having two lots of chicken under one roof so that the outer brooder should be likewise divided and have a wire run at each end into which the chicken from each can run.

It will be found necessary at first to lift the chicken out from under the mops for feeding, but they very soon learn to find their way out and give no further trouble. The floor of the brood box should be covered with thick brown paper, and well lined with soft hay to keep in the warmth.

W

An arrangement should be made for raising the mops above the chicken as the latter grow, in order to harden them off and at five or six weeks old they will be able to do without them, and at seven or eight weeks will not require the brood box, but may be left in the brooder or removed to a larger house if the brooder is required for others.

Such a brooder as this could not entirely supersede the artificially heated ones—as it is not entirely satisfactory in very cold weather, and cannot successfully be used outside much before March. But from March onwards it can be used with perfect success, requiring only a little protection by means of sacks thrown over on cold nights, and it has distinct advantages over the heated kind in that it costs less to buy and keep up—and it also takes less time and trouble to attend to.

P. R. C.

INVESTIGATION INTO THE RETARDING EFFECT OF LIME ON THE GROWTH OF CONIFERS.

An investigation was started at the Royal Agricultural College in 1914, the object of which was to ascertain the effect of varying quantities of calcium carbonate on the growth and development of certain conifers. Douglas Fir *(Pseudotsuga Douglasii)* was the species selected, since it is a calcifuge. Two year seedlings were obtained from a district where the soil contained insufficient calcium carbonate to affect their growth. Artificial soils were made from sand free from lime, 5 per cent. of leaf mould obtained from a beech wood in Earl Bathurst's Park, and varying quantities of calcium carbonate in the form of ground chalk. The soils were placed in specially prepared concrete pits, which were similarly situated and all adjoining, and the seedlings, 25 to a pit, were planted at equal distances from one another. Samples of each soil were taken and the amount of carbonate of lime determined. The percentages are calculated on the soil dried at 100°C. The seedlings were planted in March and measured in the following May. Their heights were again taken in the May of the present year. Further measurements will be made again at the end of the growing period. Table I. shows the percentages of calcium carbonate in the plots and the measurements of the firs.

TABLE I.

No. of Plot.	Percentage of Calcium Carbonate in Soils dried at 100°C.	Max. Height of Single Seedling in inches.		Min. Height of Single Seedling in inches.		Average Height for whole Plot in inches.	
		1914.	1915.	1914.	1915.	1914.	1915.
1	1·12	7	22·5	3·5	12	5·1	17·7
2	2·72	5·5	21·25	3	8	4·1	14·5
3	3·92	6	17·25	3·5	7	4·5	11·8
4	8·33	7	14	3·25	5·5	5	9·6
5	11·12	6·75	17·5	3	5	4·6	9·8
6	15·88	7·25	18·5	3·25	9	4·6	11·8

It will be seen that in 1914 the average height for the whole plots varied but slightly, but that in 1915 the differences were marked.

Table II. shows the increase in one year's growth of the plots, also the number of plants diseased, and those showing chlorotic features.

TABLE II.

No. of Plot.	Average Height for whole Plot, 1915.	Average Height for whole Plot, 1914.	Increase in One Year's Growth.	Plants Dead.	Plants showing Chlorosis.
1	17·5	5·1	12·6	—	—
2	14·5	4·1	10·4	—	—
3	11·8	4·5	7·3	2	3
4	9·6	5	4·6	8	11
5	9·8	4·6	5·2	5	13
6	11·8	4·6	7·2	2	4

This shows that Plot I. with 1·12 per cent. calcium carbonate has an increase in one year's growth of 12·6 inches, whereas Plot IV. with 8·33 per cent. calcium carbonate has only 4·6 inches.

The general appearance of the plants in the first four plots is worthy of mention. Those in Plots I. and II. are of a dark green colour, and look exceedingly strong. Plot III. has a lighter colour, and three plants are chlorotic. Eight plants have died in Plot IV., and eleven are distinctly yellowish in appearance. In Plot IV. the minimum increase of growth is reached, and growth rises again in Plots V. and VI. in spite of the fact that the percentages of calcium carbonate are much higher. In Plot V. five plants have died, and thirteen show chlorosis. No doubt the slight superiority over Plot IV. is only temporary. Plot VI. is quite exceptional. It has nearly 16 per cent. calcium carbonate, yet only two plants have died, four are chlorotic, and the rest look exceedingly strong. It was thought at one time that the soil in this plot might not be evenly mixed, but analyses of samples taken close to the strong plants and in the immediate vicinity of the chlorotic plants showed very little difference.

It is clear that some factor counteracts the retarding influence of the calcium carbonate. Analysis of samples of soil in Plot VI. taken a short time after a shower gave 10·18 per cent. moisture, whereas Plot I. gave only 6·59 per cent., so that the superior water retaining capacity of Plot VI. may possibly account for the strong growth of the plants. Another point is that Plot VI. has slightly more shade than the other plots. It should be remembered that all the results obtained are only on one year's growth, and that the influence of the carbonate of lime may assert itself at a later stage. The conclusions which can be drawn from the experiments are summarised as follows :

(1) Douglas Firs grow well in sandy soils with small amounts of calcium carbonate.

(2) Increasing quantities of calcium carbonate up to 8 per cent. have a distinct retarding effect on their growth.

(3) Above 8 per cent. of calcium carbonate, some factor, whose influence has not yet been established, dominates this retarding effect of the lime.

A. D. Hopkinson.
H. D. Elkington.

EXCURSION TO MAISEMORE PARK.

On Thursday, June 17th, a party of students, headed by Professor Turner, motored over to Maisemore Park, near Gloucester, at the invitation of Mr. Cridlan, to inspect his well-known herd of pedigree Aberdeen-Angus cattle.

The house is charmingly situated in the Severn Valley, and has a good view of Gloucester Cathedral, with the Cotswold Hills in the background ; and the farm buildings are well suited to their work, consisting essentially of rows of boxes surrounding yards which have recently been covered in and divided into separate runs for each box.

Mr. Cridlan started breeding in 1898, and by his personal attention and judgment has now built up a herd second to none for appearance and pedigree, many of the beasts tracing back to Old Jock, the property of Hugh Watson, of Keillor, which was No. 1 in the Aberdeen-Angus Herd Book.

Mr. Cridlan told us that he had picked out the Aberdeen-Angus as the supreme breed for beef production, on account of their symmetry, quality of carcase, excellence of beef, and fineness of bone ; and the accuracy of this opinion is verified almost every year at the Smithfield Show.

On this farm of 200 acres there were 140 beasts of all ages, and nearly all were inspected in the course of the afternoon, Mr. Cridlan pointing out the particular points to be noted by breeders and judges of the breed.

Among other prize-winners that we saw, the four-year-old bull, Everard II. of Maisemore, 31888, first at the Bath and West and first and champion at the Royal Show this year, and the six-year-old cow, Tulip of Standen, 45122, first at the Bath and West and second at the Royal were particularly admired.

Afterwards the party was most hospitably entertained to tea by Mrs. Cridlan, and had an opportunity of inspecting some of the trophies won by the herd, and particularly the King Edward VII. Challenge Cup, won for Mr. Cridlan last year at Smithfield by Estelle of Maisemore, and as this is the third occasion on which he has won it in five years it remains in his possession.

When tea was over Professor Turner offered a vote of thanks to Mr. and Mrs. Cridlan for the most instructive and enjoyable afternoon, and the party returned to Cirencester.

A. S. P.

FARM NOTES.

College Holding.

From the commencement of the term till the end of June a period of drought, accompanied by an east wind and a very low temperature at night, was experienced, which began to seriously affect the growth of the crops in the neighbourhood, especially the spring corn.

Owing to this cause the crops of meadow hay cut during the fine weather were considerably below the average as regards yield, although the "seeds" hay, assisted no doubt by the rainfall early in the year, has in most cases yielded very well.

The crops on the Experimental Field (No. 11), however, aided no doubt by the retentive power of the deeper soil, maintained their growth throughout the period of the drought, and now give promise of producing yields above the average. The rain (·69 in.) which fell on the evening of June 25th was greatly welcomed by the farmers in the neighbourhood, and this combined with the showery weather which followed has practically saved the root crop (swedes and turnips) from being a complete failure, and acted as a stimulant to the flagging corn crops.

The ewes and lambs of the small College flock have been grazing the Cricket Field this summer owing to play being abandoned for obvious reasons connected with the war, and several lambs have already gone off fat to the butcher.

The grass plots in Chapel Close were cut and weighed about the middle of June, and the results appear in an article elsewhere in the *Gazette*.

The results of the manurial trials on various crops in the arable field will be estimated later in the season, and the results published in due course.

D. T.

THE GLOUCESTERSHIRE VOLUNTEER REGIMENT.

The Principal, Captain J. R. Ainsworth-Davis, has raised a Cirencester unit of the Gloucestershire Volunteer Regiment, and is Commandant of the same.

OLD STUDENTS.

P. J. Murray, M.R.A.C., is now Assistant War Office Land Agent, Lands Branch, War Office. The Hon. J. Henniker-Major, M.R.A.C., and K. N. Gilbert, M.R.A.C., are Assistant Land Agents, Eastern Command. Head Quarters Eastern Command, Horse Guards, London.

SURVEYORS' INSTITUTION EXAMINATIONS, 1915.

The following Students of the R.A.C. passed the Intermediate Examination of the Surveyors' Institution—Mr. Alan S. Patten, Mr. J. M. Rayden, M.R.A.C., and Mr. P. R. Cossham.

NATIONAL DIPLOMA IN AGRICULTURE.

At the annual examination, conducted by a joint Board of the Royal Agricultural Society of England and the Highland and Agricultural Society of Scotland, held at the University of Leeds in April last, Alan Stewart Patten, obtained the Diploma, and Marayan R. K. R. Zanane passed in the first group of subjects entitling him to present himself for the remaining subjects in 1916.

CHLORINE IN RAIN WATER.

The rainfall for the six months ending March 31st, 1915, was 23·96 inches, falling on 108 days ; that for the four months, November and December, 1914, and January and February, 1915, was 20·47 inches, falling on 86 days. The six months' rainfall contained an average of ·383 grains of chlorides, reckoned as sodium chloride, per gallon, this being equal to a deposit of 29·49 lbs. of common salt per acre.

For the twelve months ending March 31st the rainfall was 35·57 inches, falling on 179 days, and the chlorides equivalent to 40·9 lbs. of common salt per acre.

E. K.

REVIEWS.

THE GLOUCESTERSHIRE OLD SPOTS PIG SOCIETY'S HERD BOOK. (Vol. I., 1915.)

A copy of the first volume of this Herd Book has been presented to the R.A.C. Library by the Hon. Secretary, Mr. E. G. F. Walker, of Chew Stoke, Bristol. To those unacquainted with the breed it may be interesting to note that the Gloucestershire Old Spots are a local breed of pigs of ancient origin found in that part of Gloucestershire known as the "Vale," which stretches from Gloucester to Bristol, and is bounded on the one side by the river Severn and on the other by the Cotswold Hills. For generations the spotted pig seems to have been bred by farmers in this fertile district and maintained its reputation for prolificacy and utility purposes, although no serious attempt appears to have been made to register the breed in a herd book. An opportunity, however, occurred when the Board of Agriculture introduced their Live Stock Scheme of Improvement in 1913, which was seized on by the admirers of the breed with the result that the Gloucestershire Old Spots Pig Society was founded towards the end of that year. After the necessary legal procedure the Society was duly incorporated, and this was followed by the publication of the first volume of the Herd Book. An excellent historical sketch showing the origin of the Gloucestershire Old Spotted Pig is given by Mr. James Peter, of Berkeley, in the introduction to the Herd Book; and at the same time he clearly sets forth the main objects in the formation of the above society. One point of interest in connection with the breed is that the colour invariably appears at an even mixture of black and white, in the form of either black spots on a white ground or of white spots on a black ground; and that a pure black or pure white pig is never produced. Reasoning from the Mendelian standpoint this would tend to show that the pig in question did not originate from a cross between a pure white pig and a pure black pig. Owing to its many excellent qualities, including its prolificacy, and to the fact that its constitution has been maintained by keeping under natural conditions, the Gloucestershire

Old Spot seems to have a great future before it as a farmer's pig for the production of first-class bacon.

D. T.

THE PRODUCTIVE FEEDING OF FARM ANIMALS. By F. W. Woll, Ph.D. Lippincott Company, Philadelphia and London. pp. xi. and 302. 6s. net.

This is a new volume of Lippincott's Farm Manuals by the Professor of Animal Nutrition in the University of California, formerly Professor at the University of Wisconsin and Ex-President of the Association of Official Agricultural Chemists of North America. The author had no light task in preparing this text-book owing to the immense amount of recent research work continually accumulating in his subject. He has endeavoured to produce a systematic digest of the matter suitable for the consumption of students and teachers; to a large extent he has succeeded, though naturally his results are more adapted to the conditions of the United States than to those of other countries. The book is well got up in the style of the publishers' previous farm manuals, it contains nearly 100 illustrations in the text, a coloured plate illustrating the composition of feeding stuffs, and several tables in an appendix showing the composition, digestibility, and manurial value of American feeding stuffs, and like information. The amount of energy in different feeding stuffs is expressed in *Therms* per 100 lbs.; one Therm being 1,000 Calories. The feed-unit system of calculating the comparative nutritive value of different foods is explained. This system originated in Denmark, the feeding experiments upon which it is founded being for the most part made at the Copenhagen Experiment Station. All feeds are referred to a standard feed-unit which is 1lb. of mixed cereal grains; about 1·1 lbs. of wheat bran, or 2·5 lbs. of mixed hay, or 12·5 lbs. of turnips are equivalents. The value of pasture to cows is estimated at 6 to 12 units a day according to conditions: a 1,000 lb. cow requires 6·6 feed-units a day for maintenance and about 7·2 units in addition for milk production. It would have been better to have given in every case the botanical names of grasses, etc., as the United States names are sometimes difficult to identify in other countries. A useful book to the teacher and the advanced student.

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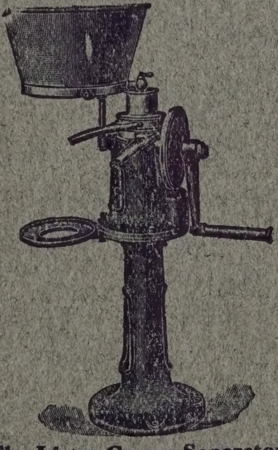

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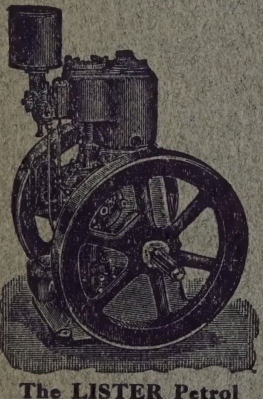

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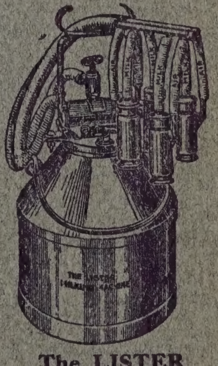

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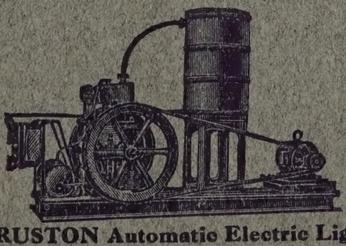

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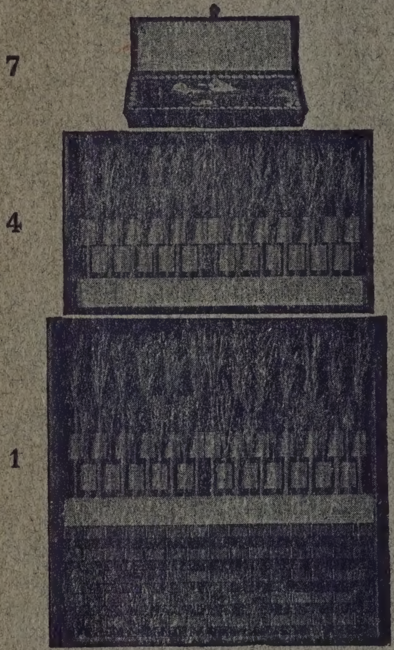

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